INSIDE: THE MOUNTAIN BLUEBIRD BLUES

Montana Outdoors

MONTANA FISH, WILDLIFE

MARCH–APRIL 2014

Getting It Right with WOLVES

Striking a fair and scientifically sound balance

IN THIS ISSUE:

WHAT MARRED THAT TREE?

HAGENER: IT'S TIME TO TALK

AN ENTIRE BEAR IN A SINGLE HAIR

PROTECTING LIVESTOCK WITH FLAGS

Montana Fish, Wildlife & Parks

FIRST PLACE MAGAZINE:
2005, 2006, 2008, 2011
Awarded by the Association for Conservation Information

FIRST PLACE MAGAZINE: 2012
Awarded by the National Association of Government Communicators

STATE OF MONTANA
Steve Bullock, Governor

MONTANA FISH, WILDLIFE & PARKS
M. Jeff Hagener, Director

MONTANA FISH AND WILDLIFE COMMISSION
Dan Vermillion, Chairman
Richard Stuker
Matthew Tourtlotte
Lawrence Wetsit
Gary Wolfe

COMMUNICATION AND EDUCATION DIVISION
Ron Aasheim, Administrator

***MONTANA OUTDOORS* STAFF**
Tom Dickson, Editor
Luke Duran, Art Director
Debbie Sternberg, Circulation Manager

***MONTANA OUTDOORS* MAGAZINE**
VOLUME 45, NUMBER 2
For address changes or other subscription information call
800-678-6668

Montana Outdoors (ISSN 0027-0016) is published bimonthly by Montana Fish, Wildlife & Parks. Subscription rates are $12 for one year, $20 for two years, and $27 for three years. (Please add $3 per year for Canadian subscriptions. All other foreign subscriptions, airmail only, are $48 for one year.) Individual copies and back issues cost $4.50 each (includes postage). Although *Montana Outdoors* is copyrighted, permission to reprint articles is available by writing our office or phoning us at (406) 495-3257. All correspondence should be addressed to: *Montana Outdoors*, Montana Fish, Wildlife & Parks, 930 West Custer Avenue, P. O. Box 200701, Helena, MT 59620-0701. E-mail us at **montanaoutdoors@mt.gov**. Our website address is **fwp.mt.gov/mtoutdoors**.

©2014, Montana Fish, Wildlife & Parks. All rights reserved.

Postmaster: Send address changes to *Montana Outdoors*, Montana Fish, Wildlife & Parks, P.O. Box 200701, Helena, MT 59620-0701. Preferred periodicals postage paid at Helena, MT 59601, and additional mailing offices.

Montana Outdoors

MARCH–APRIL 2014

FEATURES

10 How to Read a Tree Learn to decipher the stories that wildlife leave behind on bark and branches. *By Ellen Horowitz*

16 The Heart of Darkness Finding wildness and wonder in the night sky. *By David Cronenwett*

20 Weighing In On Wolves Montana works to strike a fair and biologically sound balance between having enough of the large carnivores and having too many. *By Tom Dickson*

26 Reading an Animal's "Fingerprints"
DNA science improves fish and wildlife conservation, management, and law enforcement. *By Ted Brewer*

30 Turf War Twist
Why mountain bluebirds have disappeared from western Montana's valleys—and might never return. *By Renée A. Duckworth and Alexander V. Badyaev*

DEPARTMENTS

2 LETTERS

3 EATING THE OUTDOORS Pheasant Pot Pie

4 OUR POINT OF VIEW Meeting Face-to-Face Is Essential for Improving Hunter-Landowner Relations

5 FWP AT WORK Liz Bradley, Wolf Specialist, Missoula

6 SNAPSHOT

8 OUTDOORS REPORT

36 THE BACK PORCH Leaves of Bone

37 OUTDOORS PORTRAIT Hoary Bat

38 PARTING SHOT Light Show

CONFINED TO THE MOUNTAINS
Over the past 20 years, the mountain bluebird has largely disappeared from western Montana valleys. Learn why on page 30. Photo by Alexander V. Badyaev.

FRONT COVER
How many wolves is enough? See page 20. Wild wolf in Yellowstone National Park by Cindy Goeddel.

Bird-brained error axes 135 Montana species

In your November-December issue, you reported that the number of bird species recorded in Montana is 294. In October 2013 the Montana Bird Records Committee voted to accept two new species to the official state list, bringing the total to 429 species recorded in Montana. It seems you overlooked a few.

Robin M. Wolcott
Sacajawea Audubon, Bozeman

The reader is correct. See top left of page 8.

Bison article stirs passion

As a frequent visitor to all parts of beautiful Montana and a longtime subscriber to *Montana Outdoors*, I was most interested in the article "Butting Heads Over Bison" in the November-December 2013 issue. I certainly disagree with the statement by one Montana legislator that the buffalo's "time has passed." Has the time passed also for the European bison, willingly being restored to Poland? Or for the cousins to buffalo, the wildebeest, in the Serengeti plains and other extensive areas of Africa? Of course not. This tremendous cultural symbol of the American plains can certainly be accommodated in places like the Charles M. Russell National Wildlife Refuge if done properly through the use of public hunting, proper fencing, and other management tools.

The large buffalo herd in Custer State Park in the Black Hills of South Dakota is a perfect example of the economic draw of these unique animals. The same goes for the National Bison Range near Moiese. And how about the free-roaming bison herds in the agricultural area of Delta Junction, Alaska, south of Fairbanks, as well as in other areas of that state—all managed through public hunting?

Don't deny the great state of Montana this splendid opportunity to prudently enlarge the range of this American icon.

Calvin J. Klein
Philadelphia, PA

On the open plains of eastern Montana, wildlife advocates want to restore free-ranging bison. Livestock producers strongly oppose the idea. What's a ranch-owning hunter to do?

BY ANDREW MCKEAN

BUTTING HEADS OVER BISON

The badlands and sagebrush prairies south of my house, where I hunt mule deer and graze cow-calf pairs with my neighbors, don't look like a battleground.

"Butting Heads Over Bison" accurately described the legitimate interests that are at stake in the question of whether to restore bison to the Montana prairie. However, it is unfortunate that both the title and the article portray the issue as a conflict. Bison restoration is a conflict only because wildlife management agencies have characterized it as such. By doing so, they have pitted one interest against another and invited the stakeholders to engage in the resulting dog fight.

> "This should not be a conflict in which FWP picks the winners and losers."

Bison restoration would be a significant conservation achievement. If FWP is serious about undertaking this endeavor—and I agree that it should—the department must reframe the issue as a matter of defining bison conservation as a real partnership among tribes, landowners, sportsmen, and relevant state and federal agencies. The partnership then could develop a management strategy that serves all legitimate interests.

The development of a sustainable approach to bison conservation should enfranchise all the partners in the enterprise. This should not be a conflict in which FWP picks the winners and losers.

John Mundinger
Helena

And then there's Lola, the showgirl

I loved your 2014 photo issue. Best ever. But on page 8 you have "Lulu Pass." Shouldn't that be "Lolo Pass" (along the Idaho border west of Missoula)?

Beth Markell
Billings

We, too, thought the photographer had made a typo when identifying the photo location, but it turns out there really is a Lulu Pass, located near Cooke City.

It's hunters who pay the price

I would like to respond to the letter in the November-December issue titled "Again to pay the price" that criticizes the killing of wolves and other large carnivores. It states that "the answer [to large carnivore management] can usually be found by following the money. This is no exception."

Well, let's do just that. Montana is one of the few states that doesn't provide its wildlife agency with some general fund money. In 2011, according to the department, $58.7 million was generated by hunting and fishing license fees. This revenue is broken down and used for everything from paying wardens (who we don't have enough of and are paid too little) to, you guessed it, managing wolves and other large carnivores. Hunters understand the difficult balancing act necessary to maintain healthy populations of all wildlife species.

Most wildlife conservation groups in Montana and nationwide are largely made up of sportsmen. The members and staff of these organizations work hard to help maintain habitat and ensure healthy populations of all species.

All are willing to work with FWP to do this. In my opinion, there is no one more in touch with the overall health of our wildlife than hunters. Yes, every group has its bad apples. We hunters are no different. But the majority genuinely care about our wildlife with every grain of our being. So rather than hating Montana hunters, as the letter writer seems to, maybe he should thank us. The management of the wildlife he enjoys in Montana is largely carried on our shoulders.

Ron Watt
Butte

Write to us

We welcome all your comments, questions, and letters to the editor. We'll edit letters as needed for accuracy, style, and length. Reach us at Montana Outdoors, P.O. Box 200701, Helena, MT 59620-0701. Or e-mail us at tdickson@mt.gov.

Tom Reichner

Don't miss a single issue: **Subscribe today!**

YES! I'd like a year (six issues) of *Montana Outdoors* for just $12.

My/Donor Information: (Required for gift subscription)

Name

Address

City State Zip

Select: 1 Year *6/$12* 2 Years *12/$20* 3 Years *18/$27*

Send a Gift to: (Please print)

Name

Address

City State Zip

Select: 1 Year *6/$12* 2 Years *12/$20* 3 Years *18/$27*

Best Deal!

Payment enclosed Bill me later

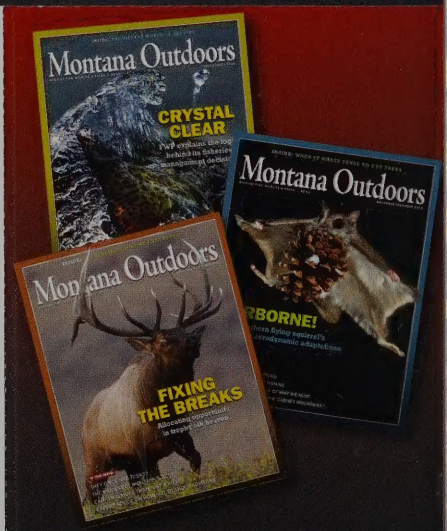
Add $3 per year for Canadian subscriptions.
All other foreign subscriptions are $48/year, paid in advance

For faster service, subscribe by phone: **(800) 678-6668**
Or subscribe online: **fwp.mt.gov/mtoutdoors**

U14A

Place
Stamp
Here

MONTANA OUTDOORS
MONTANA FISH WILDLIFE & PARKS
930 W CUSTER AVE
PO BOX 200701
HELENA MT 59620-0701



Subscribe today and you'll receive the latest on Montana's:

- fish and wildlife management
- conservation issues and activities
- hunting, fishing, and wildlife watching

Plus the annual photo issue!

Pheasant pot pie

By Tom Dickson | Preparation Time: 20 min. | Cooking Time: 35 min. | Serves: 6

When my springer spaniel Simon finds strong pheasant scent, he starts cutting back and forth through the brush like an NFL tailback dodging tacklers. That's how it was this past December while we were hunting a state section in central Montana that sometimes holds a late-season rooster or two.

At the end of a large expanse of snowberry abutting a wheat stubble field, Simon went from his usual fluid weaving pattern into the zigzag overdrive that means he's found birds. Sure enough, pheasants started bursting up from all directions, causing me to spin in place trying to identify the sex of what turned out to be one hen after another. Simon was not so easily distracted. Ignoring the flushing females, he continued racing up a faint furrow leading away from the ruckus toward the open field. There, just within shotgun range, he put up a rooster that I was able to drop with one lucky shot.

Simon was on the dead bird in a flash. But so was Mesa, my wire-haired pointing griffon pup. As Simon tried to retrieve the rooster, Mesa trotted alongside, annoyingly tugging at its head and legs, causing the springer to grip the bird ever more tightly. I heard bones crunch. When he finally dropped the rooster at my feet, I looked down at the crumpled carcass and thought, "Pot pie."

The beauty of pot pies is you can use whatever leftover, shot-up, freezer-burned, or dog-damaged game birds you have on hand. Of course it's best to use fresh, unmarred portions—the taste and texture of damaged meat always suffer—but if you occasionally pummel a bird or own a retriever with a vise-like mouth, you can do worse than cooking the mangled meat with vegetables in a savory, crust-enclosed gravy.

The following recipe combines several I've tried over the years. The crust recipe here is easy as, well, pie, but ready-made ones work fine, too.

—Tom Dickson is editor of Montana Outdoors.

CRUST

2 c. all-purpose flour
½ c. canola or vegetable oil
5 T. water (plus 2 T. for egg wash)
1 egg (for egg wash)

PREPARATION: Mix oil and 5 T. of water and stir into flour to form dough. Divide into two equal parts. Roll out each part between wax paper to make two pastries.

FILLING

2½ pounds boneless pheasant, grouse, or turkey meat, cut into 1-inch pieces
Salt and pepper
3 T. olive or vegetable oil
3 garlic cloves, minced
3 celery ribs, diced
1 c. butternut squash or carrots, chopped into 1-inch chunks
3 c. chicken stock
5 T. butter
¾ c. all-purpose flour
1 c. heavy cream
1 t. dried rosemary
½ c. frozen pearl onions, cut in half
½ c. frozen peas

PREPARATION: Preheat oven to 375°. Heat 2 T. of the oil over medium-high heat in a large cast-iron skillet. Salt and pepper meat and add to the pan. Cook until browned, stirring occasionally. Set meat aside. Add remaining 1 T. oil to the pan along with the garlic, celery, and squash (or carrots), and cook until slightly soft. Set aside.

Bring stock to a simmering boil in a small pot. In a saucepan, melt butter over medium heat. Whisk in flour for 1 minute. Add stock and cream. Once mixture boils, turn heat down and simmer, whisking all the while, for 5 minutes. Add rosemary and season with salt and pepper.

To the cream mixture, stir in meat and all vegetables.

Place one pastry in a 9-inch glass pie pan. Trim so it's ½-inch wider than the glass edge. Spoon filling into the pastry-lined pan. Top with second pastry. Pinch the two edges together to seal. Cut slits in several places in top for steam to escape.

Make egg wash by mixing egg with 2 T. water. Brush top pastry with mixture. Bake pot pie for 35 minutes or until crust is golden.

SHUTTERSTOCK

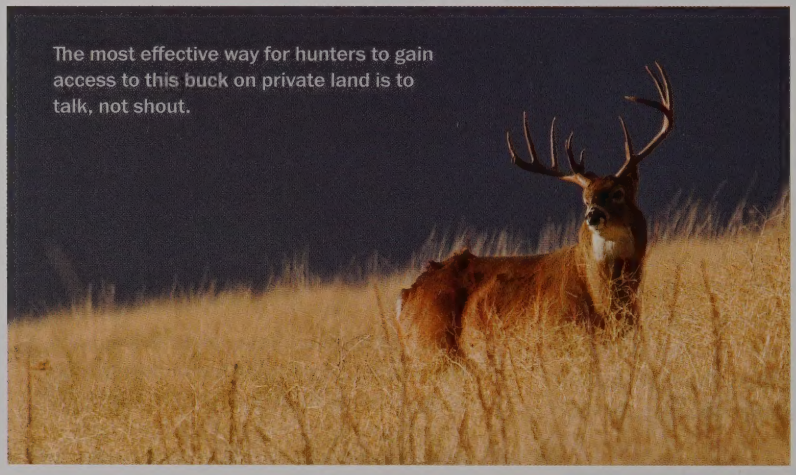
Meeting face-to-face is essential for improving hunter-landowner relations

Sportsmen need to improve relations with landowners. Many hunters don't like to hear that, but I've been around long enough to know it's necessary—and that if it doesn't happen, public hunting access to private land across Montana will continue to decline.

Yes, landowners bear their share of responsibility for deteriorating relations between them and the sporting community. Growing numbers of landowners have made previously accessible land off-limits to public hunting. And some have pushed for free elk and deer tags they can sell, as is allowed in a few other states. That's something Montanans reject as completely at odds with the state's tradition of keeping wildlife from becoming commercialized.

In an ideal world, landowners would open their gates more often. But no law says they have to. With respect to public access on private land, property owners hold most of the cards. And their hand is getting stronger by the day.

Montana's landscape is changing far faster than most people realize. I don't mean subdevelopments and ranchettes that continue to spring up in the state's western river valleys and mountain foothills, though they, too, are a concern. I'm talking about massive tracts of land—sometimes hundreds of thousands of acres at a time—being bought up in Montana. Many were previously accessible to public hunting thanks to traditions honored by longtime ranching families or through our Block Management Program. Now many of those ranches, purchased by people unfamiliar with Montana's culture of wildlife conservation, are sprouting "No Hunting" signs.



The most effective way for hunters to gain access to this buck on private land is to talk, not shout.

These enormous land transfers are no secret. Newspapers have covered several recent sales of large ranches containing valuable wildlife habitat on which future access is uncertain. The sales are fueled by Montana's relatively low land prices, increasing real estate values, and growing demand for private hunting recreation property. Real estate specialists predict the trend will continue.

What can be done to convince landowners large and small that it would be okay to let a Bozeman schoolteacher, or a Billings husband and wife, or a Lewistown family onto their land to hunt elk or deer or pheasants? Criticizing landowners in the press or trying to "force" them to open their gates with legislation doesn't work. Just the opposite. In many cases, landowners respond to political pressure by shutting down even more access.

What does seem to work is FWP staff and sportsmen meeting with landowners to learn about their concerns. It turns out that the incentive for opening access often isn't money. For many landowners, it can be something as simple as hunters and FWP acknowledging that private land provides habitat for 70 percent of Montana's deer and pronghorn and one-third of its elk. Some—especially nonresident landowners—want licenses, permits, and tags to be more accessible. Others would appreciate hunters volunteering to fix fences or help with branding during the off-season. Many want assistance managing hunting traffic and access, which is what Block Management provides and is one reason for its success.

We have to find new, innovative ways to bridge the growing gap between the public hunter and the private landowner.

Montana is working toward increasing public access on private land. In recent months, others in the department and I have met with several owners of large properties to listen to their concerns and also explain why opening their land to at least some public access may be in their best interest. We are also identifying critical parcels—some of just a few hundred acres—that FWP or conservation groups might purchase from willing sellers that would provide access to large tracts of federal land. Governor Steve Bullock has charged the Private Land/Public Wildlife Council—composed of landowners, hunters, outfitters, and other citizens—with carrying out a complete review of all public access programs. The review includes everything from funding to landowner incentives and is intended to make the programs more responsive to both hunters' and property owners' needs. Meanwhile, sportsmen in some areas are meeting with landowners, initiating volunteer sportsmen "work days" on ranches, and even acting as hunting coordinators so that landowners have a responsible point person to keep watch over who is hunting and when.

All this is a great start, but it's not nearly enough. If we want to keep Montana's hunting heritage alive and continue to be a state that leads the nation in wildlife conservation, we have to find new, innovative ways to bridge the growing gap between the public hunter and the private landowner.

—**M. Jeff Hagener,** *Montana Fish, Wildlife & Parks Director*

PAUL N. QUEANEAU

PAUL N. QUEARNEAU

PROBLEM SOLVER

LIZ BRADLEY
Wolf Specialist, Missoula

"**A BIG PART OF OUR JOB** is to reduce conflicts between wolves and people living on the landscape with wolves. What I'm doing here is putting up fladry [fence flagging] around a 20-acre calving area near Alberton where wolves had killed a calf a few days earlier and another was missing. [The U.S. Department of Agriculture's] Wildlife Services investigated but was unable to set traps due to freeze-thaw conditions, so the rancher was open to using fladry, which works best on relatively smaller pastures like this or on hobby ranches. There's something about the fluttering of the flags that scares wolves off, so we string fladry up around the pastures and then the rancher checks each day to make sure it hasn't fallen down. Because there was no fresh snow, we couldn't tell if wolves later came up to the fladry and were scared off—as happened on a similar project I was working on at the time north of Missoula—or if they just never returned. But there were no further problems with these cattle."

Photographer **MIKE CLARK**, who lives in Denver and Helena, watched this pronghorn and her two fawns during several snowy days in early spring just outside Yellowstone National Park's northwestern entrance at Gardiner. "We didn't think the fawns would survive. The snow was heavy and wet, the fawns were soaked the whole time, and we could hear coyotes at night in all directions," Clark says. "The doe would hide the fawns in a slight depression and then position herself far enough away to not call attention to them. It was tough to watch, because it was snowing hard and the fawns were exposed out there on their own. But every few hours she'd return and nudge them up to run around and nurse. Each morning we were sure they'd died. But after a while we'd see their ears sticking up from behind a slight rise and cheer that they'd made it through one more night." ■

429

Actual number of bird species recorded in Montana, according to the Montana Bird Records Committee

(not 294, as was mistakenly listed in this space in the November-December 2013 issue)

Winter feeding hurts, not helps, Montana wildlife

March can be a cruel month for deer, elk, and other wildlife. Late winter snowstorms and cold can tax the fat reserves that the animals put on the previous fall. But supplemental feeding in late winter by well-meaning people actually does wildlife more harm than good. Among the problems:

- Increases the risk of disease by concentrating the animals.
- Teaches fawns, calves, and other young to depend on humans for food.
- Causes wildlife to lose their fear of humans, possibly causing risks to human safety.
- Attracts predators such as mountain lions to feeding areas.

Purposefully feeding wildlife is also illegal, punishable by fines and even jail time. ■

The future looks grim for pheasants and ducks. The largescale conversion of CRP grasslands to wheat and corn gives the birds far fewer places to nest.

UPLAND HABITAT

Good-bye grasslands

FWP game warden Tom Chianelli could not believe his eyes this past fall when he returned to one of his traditional pheasant hunting areas in far northeastern Montana's Sheridan County. "Huge chunks of CRP had been converted to cropland," says the Thompson Falls–area warden, who for years was stationed in Plentywood and met many landowners enrolled in the federal Conservation Reserve Program (CRP).

The farm program provides annual payments to landowners who plant highly erodible land to native grasses. The grasses reduce runoff into waterways and provide habitat for pheasants, waterfowl, songbirds, deer, and other wildlife.

Commodity prices were low when many farmers enrolled in the program five or ten years ago. No longer. With recent record grain prices, it often makes more economic sense to plow grasslands and plant corn or wheat.

Corn prices rose largely due to a federal mandate to include ethanol in gasoline, as well as increasing global demand for grain-fed beef. As wheat fields have been converted to more profitable corn, wheat supplies declined, raising the price for that commodity as well. Federal payments for CRP acres can no longer compete.

The grassland conversions occur in Montana's prime game bird region. According to new figures released by Ducks Unlimited, CRP acres along the Hi-Line have declined 54 percent since 2006, a loss of more than 800,000 acres. Some of the biggest declines have been in Sheridan County, Montana's top pheasant producer (down 68 percent), and Phillips County, the state's top duck producer and home to hundreds of prairie potholes (down 66 percent).

Concern by budget hawks over the federal deficit has made Congress balk at funding the popular conservation program—part of the Farm Bill—much less add more money to allow CRP payments to compete with crop revenue.

Though the large-scale grassland conversion will increase grain production for world markets and boost farm revenues, it comes at a cost. Biologists say it's inevitable the habitat loss will result in fewer upland birds, especially pheasants, as well as waterfowl, songbirds, and big game across eastern and central Montana. Streams will run dirtier, too, with fewer grasslands to filter out sediment and agricultural fertilizers.

"One friend of mine up there took, I think, his entire 3,000 acres out of CRP," Chianelli says. "He said he felt bad for the wildlife, but what else could he do? He has to make a living." ■

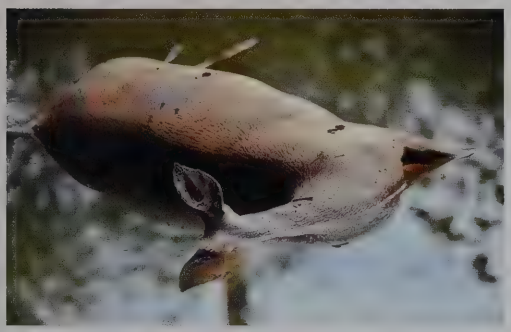
CLOCKWISE FROM TOP LEFT: ILLUSTRATION BY MIKE MORAN; SHUTTERSTOCK; *COLUMBIA MISSOURIAN*; SHUTTERSTOCK; MONTANA FWP; SHUTTERSTOCK

WILDLIFE MANAGEMENT

FWP Takes Steps to Help Recover Deer Herds

Cascade-area ranchers Cindy and Jim Kittredge used to watch 100 or more whitetails feeding in their main alfalfa field during the week before Montana's big game opener. Last fall they saw only a half-dozen or so. "We just sort of shook our heads in disbelief at how quickly they disappeared," says Jim Kittredge.

Reports of few or no whitetails were widespread across central and eastern Montana this past hunting season. FWP biologists say the animals have been hammered in recent years by deep snow in 2010-2011 and outbreaks of epizootic hemorrhagic disease (EHD). The disease appears to have hit especially hard in spring and summer 2013.



A dead whitetail that likely succumbed to epizootic hemorrhagic disease.

The epidemic may be the result of warmer-than-usual fall weather in recent years. High temperatures in September and October allow biting midges carrying the EHD virus a chance to linger a bit longer before cold weather kills them. This exposes more deer to bugs carrying the disease.

Infected deer usually die from internal bleeding caused by blood clotting failure. Many are found dead in ponds, streams, or other water, which they seek while in a feverish state.

Mule deer numbers were down, too. The most recent reduction was due to the aftereffects of the tough winter three years ago.

Responding to concerns by hunters and outfitters, FWP has cut back on antlerless mule deer hunting opportunities over the past several years in many parts of the species' range. The department also reduced antlerless whitetail licenses during the past two years. Because does can produce one or two fawns each spring, temporarily reducing the antlerless harvest can help deer populations rebound more quickly.

For the 2014 season, the Montana Fish and Wildlife Commission proposed making mule deer hunting "bucks only" statewide and, in much of central and eastern Montana, no longer selling "B" licenses, which allow hunters to take additional antlerless deer, in most cases whitetails.

Hunting organizations statewide generally supported the proposals, though some hunters, as well as landowners concerned about crop depredation, thought the regulations were overly sweeping and would restrict antlerless harvest in areas where deer were still doing well.

The commission's final decision, factoring in public opinion, is due later this winter. ■

DEADLINES

APPLICATIONS DUE MARCH 15

Hunters hoping to be drawn for deer or elk permits must get their applications to FWP by March 15. This is the third year of the earlier deadline, which the Fish and Wildlife Commission moved ahead to give successful permit applicants additional time to plan their fall hunts. Questions? Call FWP at (406) 444-2950. ■

MONTANA NONRESIDENT
2014
15
March
NONRESIDENT COMBINATION LICENSE AND DEER AND ELK PERMIT APPLICATION PACKET
Apply for your license and permits by March 15, 2014
2014 is the first year in Montana's 2014 and 2015 biennial hunting season-setting process. Please note:
2014 DEER & ELK SEASON DATES
Archery (bow and arrow license required)...Sept. 6 – Oct. 19
Youth (deer only, 2-day hunt)
General ...Oct. 18 –

Bakken muley study begins

Wyoming studies show that gas wells and the accompanying noise, roads, and traffic drive away mule deer, reducing populations significantly in energy-producing areas of that state.

Will energy development in western North Dakota and predicted for eastern Montana have the same effects? Wildlife researchers aim to find out.

With funding from the Montana Department of Natural Resources and Conservation, FWP has begun studies in two research areas—near Culbertson and near Sidney. The areas will be part of a larger study under way by the North Dakota Game and Fish Department just over the Montana–North Dakota border along the Little Missouri River. The project examines how the oil fracking boom affects mule deer populations, habitat use, and distribution.

"It's essential for Montana to develop baselines for these aspects of mule deer ecology, against which we can judge the impacts of energy development once we see it here," says Ken McDonald, head of the FWP Wildlife Division. ■

How to Read a Tree

Learn to decipher the stories that wildlife leave behind on bark and branches. **BY ELLEN HOROWITZ**

PHOTO BY ZACK CLOTHIER

BARK MARK Bear scratches are the easiest tree hieroglyphics to decipher. Gouges made by the animal's powerful claws on the trunks of aspens or poplars show up years later as dark scars.

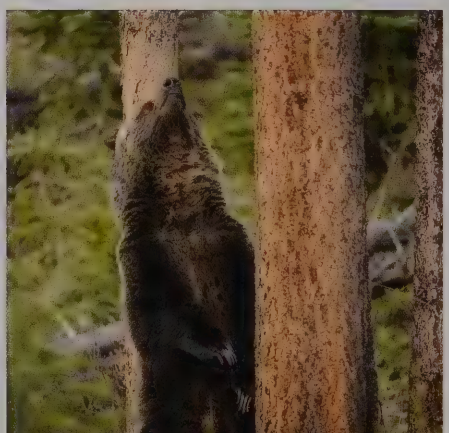
One winter many years ago while we were skiing through an aspen grove, my husband stopped to admire bear claw marks, large and small, etched on a tree. We wondered: Were they made by a female and her cub as they climbed the tree one spring day to feed on buds and catkins? Had she sent her cub up ahead of her to flee danger? Or were the dark lines and patterns on the pale trunk made by two unrelated bears that visited the grove many years apart?

That's when I first began thinking about the various ways trees can be "read" to decipher the secretive lives of many wildlife species. Since that afternoon I have rarely gone for a walk, ski, or snowshoe in the woods without noticing the hieroglyphics inscribed by furred, feathered, and six-legged creatures.

Trees attract animals of every size and type that climb, gnaw, eat, rub, thrash, and burrow into bark and branches. The scratches, scuffs, gouges, and gnaw marks left by animals on tree bark represent a form of picture writing created by claws, teeth, beaks, mandibles, and antlers. Like ink on paper, the markings show up most distinctly on aspens, darkening with age and contrasting with the smooth, cream-toned trunk. But nearly every kind of tree chronicles the lives of forest dwellers. Once you know what to look for, even dark, rough-textured trunks read like picture books.

Bear claw gouges are among the most conspicuous bark marks. Some are from climbing bears, while others indicate a paw's vertical swipe that rakes a trunk for several inches. I've also seen marks made by bears working both paws on a tree and bringing them close together in a V pattern. "During breeding season, males are cruising around and want to let other bears know they are in the vicinity," says Mike Madel, Montana Fish, Wildlife & Parks grizzly bear management specialist in Choteau. "When a male griz comes to a tree, he stands up, sniffs and rubs, and bites and claws, like he's saying, 'This is who I am.'"

Trees close to trails make convenient and easy-to-read message boards for bears to leave and receive notices. The same is true of "rub" trees. Once thought to be simply places used to relieve a bear's itchy back, rub trees are now recognized as a type of bruin signpost. They allow males to communicate with each other by scent, which helps reduce fighting over potential mates. Trees used by bears over generations display a patina where the bark is worn smooth from rubbing. Other rub trees may be coated with dirt or covered in hair. Females and cubs also use rub trees, though biologists aren't sure why.



SENDING A TREE "TEXT" A grizzly bear rubs a midsized conifer to tell others, "I was here."

TEARING UP TREES

Trees are convenient bulletin boards for other animals, too. Mature bull elk prefer saplings for advertising their dominance when the rut begins in September. Rubs start about 3 feet above the ground and go as high as the bull's antlers can reach. Elk hair commonly appears on vigorously rubbed trees. "Elk rub with a vengeance," says Tim Thier, FWP wildlife biologist in Trego. "They twist their head so hard I've seen them rip young trees right out of the ground." Shredded branches and trunks indicate to other bulls the size and power of the testosterone-crazed bull that caused the damage. The noise created by the commotion sends a message of "Bring it on" to other bulls within earshot

Buck deer leave sign on shrubs and young trees starting in late summer, when their antlers finish growing and harden. Rubbing on woody plants removes dried velvet and stains the antlers various shades of brown. High-ranking bucks continue to rub their antlers on trees throughout fall. Deer rubs typically appear on smooth-barked trees 1 to 4 inches in diameter, though larger trees are sometimes used by especially big bucks. Rub tree bark looks scraped or shredded from 1 to 4 feet above the ground. Bucks also leave a scent message to younger bucks and does by rubbing glands on their forehead against low-hanging branches.

BITE MARKS

Animals that eat tree components leave evidence of their dining. Bears, for instance, tear off outer bark to reach the sweet and nutritious inner bark and cambium in spring. Madel says a bear initially bites into a tree with its canine teeth until it lacerates the bark. Then it grips the torn piece with the upper and lower incisors "like a pincers," he says, and tugs with all its might. Once the outer bark is yanked clear of the tree, the bear scrapes its incisors against the freshly exposed inner layer. Pieces of bark lie strewn

1

2

WHAT DID THIS? Guess which animals left their "signatures" on or in these trees (answers on page 15).

3

4

about the bottom of the tree or hang in jagged strips above the peeled area. Toothy grooves in the trunk are often visible.

Elk browse aspens in winter when deep snow thwarts access to the animal's preferred grasses and forbs. Because elk lack upper incisors, they gouge the trunk with their bottom front teeth in an upward or diagonal motion. In *A Field Guide to Mammal Tracking in North America*, Montana author James Halfpenny writes that the lower edge of a debarked area shows a well-defined line where the elk's teeth cut deepest into the bark. Aspen groves with many black-scarred tree trunks indicate where elk congregate during cold months. In heavily used winter range, it's not unusual to find evidence of new feeding activity above old, dark, healed-over aspen trunk sections. Bark scarring may appear several feet or more above the height of an elk's head, indicating where the animals were able to walk atop deep, densely packed snow.

In winter, voles and snowshoe hares nibble saplings for cambium when other foods are unavailable. Voles tunnel under snow and chew bark from the base of young trees, leaving tiny tooth marks as evidence. Snowshoe hares prefer to dine from atop existing snow levels, which leaves their teeth marks visible several feet up a sapling. Porcupines climb trees and chew irregularly shaped patches of bark for the cambium. It's common in porcupine range to spot trees with patches of missing bark along large portions of trunk and limbs from the animals' gnawings.

Tree markings come in all shapes and sizes. Some are dots and dashes reminiscent of Morse code; others flow like calligraphy.

Birds, particularly sapsuckers, inscribe trees from the time they show up in spring until fall migration. These members of the woodpecker family hammer small holes on tree trunks and branches to obtain sap. At one time it was thought that sapsuckers tap trees primarily to attract insects. Research now shows that the birds come specifically for the sweet liquid, and that bug consumption is incidental.

WOOD CHIPPER A northern flicker sends trunk fragments flying as it excavates a nest cavity. Large holes in trees are usually the work of flickers, sapsuckers, or woodpeckers.

Parallel rows of quarter-inch-wide round or rectangular openings, known as sapwells, denote the work of sapsuckers, with new holes appearing above older ones. The birds create the well by drilling at a downward angle and making the hole slightly deeper in the back than at the opening. The shape holds more of the high-calorie drink, reduces wasteful seepage down the trunk, and makes it easier for sapsuckers to sip.

The pileated woodpecker is another bird that leaves a trademark sign on trees. The crow-sized, stout-billed bird excavates foraging cavities roughly 8 inches wide and 14 inches deep. Its ability to reach far inside a tree's heartwood allows the woodpecker to reach abundant carpenter ants living there.

BUG MARKS

Evidence of insects appears on most every tree in the forest. Minute holes in the outer bark serve as entrances or exits for a variety of bugs that spend most of their lives hidden from view. Beneath the bark, wood-boring and engraver beetles scrawl their stories using their mandibles as writing instruments. The secretive lives of these beetles are revealed when a tree dies and the bark sloughs off. The patterns, known as galleries, are the insect equivalent of journals. Because each species has a unique way of telling its tale, entomologists can identify a beetle by its gallery. Some patterns are beautifully intricate, while others appear as broad, sawdust-packed troughs.

According to Amy Gannon, an entomologist with the Montana Department of Natural Resources and Conservation in Missoula, certain insect diaries reveal extremely complicated lives. Several species of the ips engraver beetle create complex galleries that read like chapters from *The Arabian Nights*, complete with nuptial chambers for the males' harems, the females' egg-laying chambers branching off from breeding compartments, and grooves carved by hungry larvae.

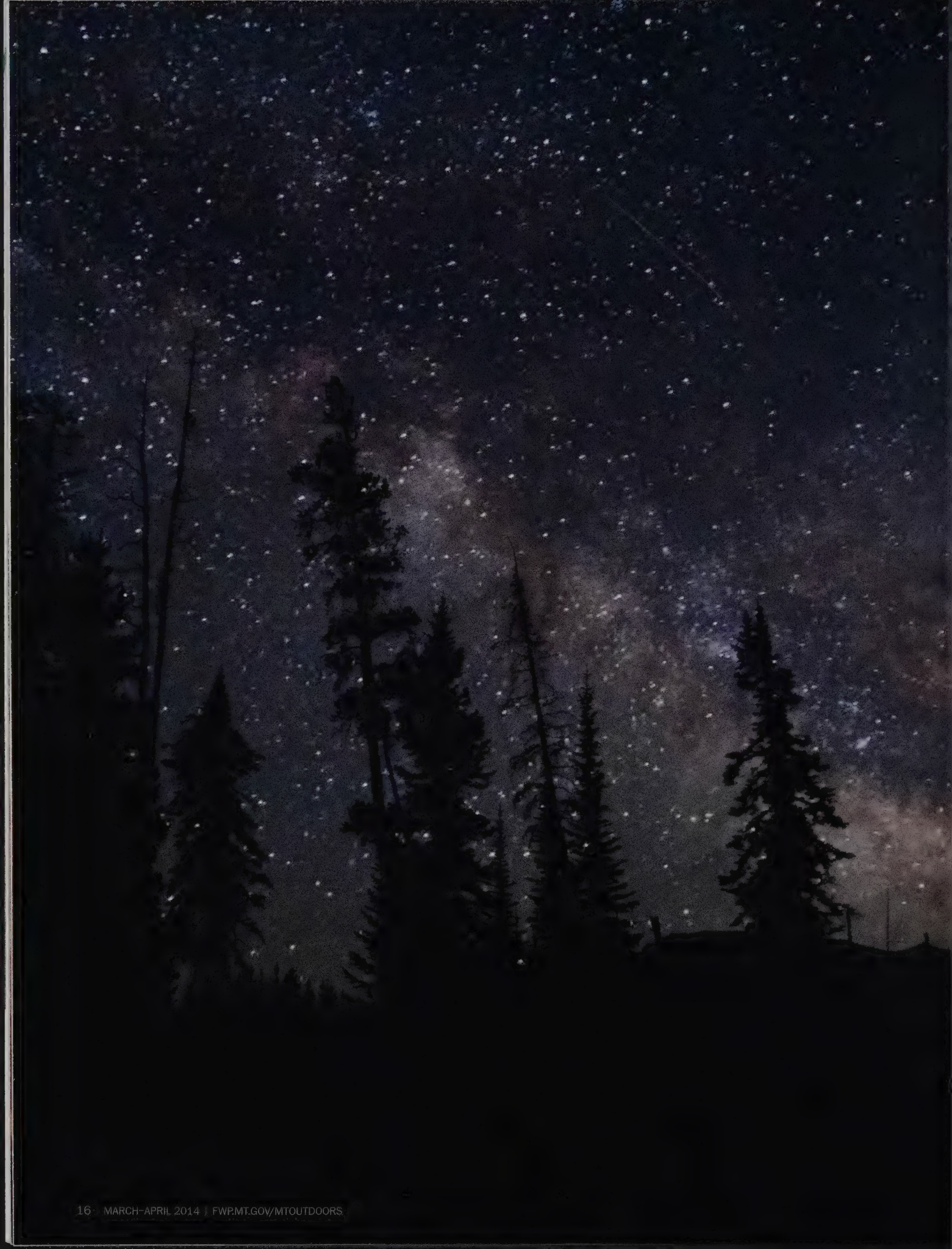
Tree markings come in all shapes and sizes. Some, like a pileated woodpecker's large excavations or a grizzly's deep slashes, denote power or aggression. Others, like an insect's delicate pinpricks, tell of tiny creatures at work. Some are dots and dashes reminiscent of Morse code; others flow like calligraphy. All have a story to tell.

When I hear someone say they didn't see anything in the woods, I suspect they didn't take the time to look. Even if animals themselves are not visible to us, many leave messages behind on trees. It's just a matter of learning the language and then slowing down to read what they wrote.

Writer Ellen Horowitz of Columbia Falls is a longtime contributor to Montana Outdoors.

CLOCKWISE FROM LEFT: BECKWOOD, MICHAEL MAURO; FRANCIS AND JANICE ROBICHAUD; SHUTTERSTOCK; TONY BYNUM

CAUGHT IN THE ACT 1. Rutting bull elk rub their antlers against the bark of saplings. 2. Woodpeckers such as this Williamson's sapsucker make elaborate patterns with their beak. 3. Black bears leave claw marks and scrapes as they climb large aspens and poplars. 4. Engraver beetles such as the ips gouge elaborate tunnels, known as galleries, that reveal where the insects lived, laid eggs, and fed.



ZACK CLOTHIER

THE HEART OF DARKNESS

FINDING WILDNESS AND WONDER IN THE NIGHT SKY

BY DAVID CRONENWETT

I'm walking west tonight, away from the slight glow of town, on an undulating prairie road with starlit mountains miles ahead. The smell of bunchgrass mingles with the scent of lupine. An occasional thud of pronghorn hooves, the animals spooked by my presence, punctuates the quiet immensity of night. As always, I look skyward for the few astronomical markers I know: Polaris, Draco, and especially Orion the Hunter. On this night's dark road, it is good to know he's there.

I've guided many people across the Rocky Mountain Front over the years and have found that its overwhelming scale and beauty rarely fail to impress. But an aspect of the place frequently overlooked is the quality of its night. Of all the resources we think of in Montana as irreplaceable, fragile, and essential to the health of ourselves and other creatures, the "natural nightscape" is seldom mentioned. It is worth visiting a large urban area periodically to fully appreciate what a precious resource we've held on to here. Recently published NASA images of Earth at night show vast areas of the continental United States ablaze with light, especially along the coasts, in the upper Midwest, and in the northeastern corridor. While sparsely settled by comparison, the interior West also is pocked with enormous, metastasizing urban centers that spread bright smears of light outward from their core like oozing lava. Even the once reliably dark plains of North Dakota have been transformed in recent years by the glow of thousands of gas-flaring drill rigs in the Bakken oil fields, looking like a Chicago-sized metropolis from space. But as we all know, it's different in Montana. No matter where you live here, it doesn't take long to drive to where you can clearly see the stars.

The night sky is never completely dark, even well away from human settlements. A clear night sky produces a spectrum of natural light from stars, the brighter phases of the moon, and the "airglow effect" of subtle illumination from cosmic particles bombarding Earth's atmosphere.

Nearly all living organisms have evolved closely with daily and seasonal fluctuations of light and dark. Unfortunately, those natural cycles are increasingly disrupted by human-caused illumination. "Scotobiology" (from the Greek *scotos*, meaning "dark") was a term coined in 2003 by scientists interested in studying the effects of anthropogenic (man-made) light pollution on species and natural systems. Light pollution harms wildlife by creating unnatural periods of attraction and repulsion, both of which can be highly disruptive (or fatal) for birds, bats, insects, and many types of mammals. A common example on any summer eve is the high concentration of flying insects attracted to a "security" light, which draws the prey away from light-averse or nocturnal species such as amphibians and bats.

One November night while in Helena, I witnessed the dramatic effects of excessive urban light on migrating snow geese. Especially low cloud cover greatly amplified

the city's sky glow, disorienting thousands of geese attempting to fly south from their last stopover at Freezeout Lake. The birds swirled above town for hours in a confused, squawking cacophony, obviously transfixed by the glowing vortex. While enchanting from the human perspective, such diversions are a dangerous waste of energy for creatures that can scarcely afford it. The National Audubon Society reports that roughly 100 million birds are killed outright in North America each year by crashing into the brightly lit windows of skyscrapers, broadcasting towers, and other illuminated structures.

Of course, bringing light to darkness is a hallmark of human civilization. First by harnessing fire, then through thousands of years of oil lamps, and finally to the invention of the incandescent lightbulb, nighttime illumination has been the most profound way in which people have alleviated anxieties over personal safety. Nighttime lighting warded off animal predators and warring tribes. It allowed people to relax and, later, read at night.

Unfortunately, we've reached a point where much of the developed world has become too bright. Light pollution can be a serious problem for humans, the vast majority of it coming from street illumination including vehicles, overhead lamps, and billboards as well as excessively lit buildings. People are intimately connected to the daily cycle of light and dark. Our 24-hour biological clock, or "circadian rhythm," is strongly regulated by the hormone melatonin, produced by the brain's pineal gland only during periods of low light. The wake-sleep cycle directly affects our immune system, mental health, and body's ability to heal. While any kind of light can inhibit melatonin secretion, the shortwave "blue" spectrum (generated by fluorescent bulbs and LED screens) is the most potent and disruptive. Scientists now believe that working the night shift, which interferes with circadian rhythm, is a contributing factor to a higher incidence of breast and prostate cancer.

They are overwhelmed by something I call "ancestral awe."

Light pollution can be easily lessened by installing street lamps that direct light downward rather than in all directions, shutting off unneeded indoor lights, and using lower-wattage bulbs. These solutions cost customers and communities less money, not more. Some of these fixes are now under way thanks to changing attitudes about the value of nighttime darkness. That impetus for dark sky conservation arose decades ago from the astronomy community, whose members worried they would soon lose the ability to observe the night sky for scientific research. Today, individuals and organizations advocate for the conservation of "natural nightscapes" through the International Dark-Sky Association (IDSA), which notes that the United States spends more than $11 billion each year on unnecessary outdoor lighting.

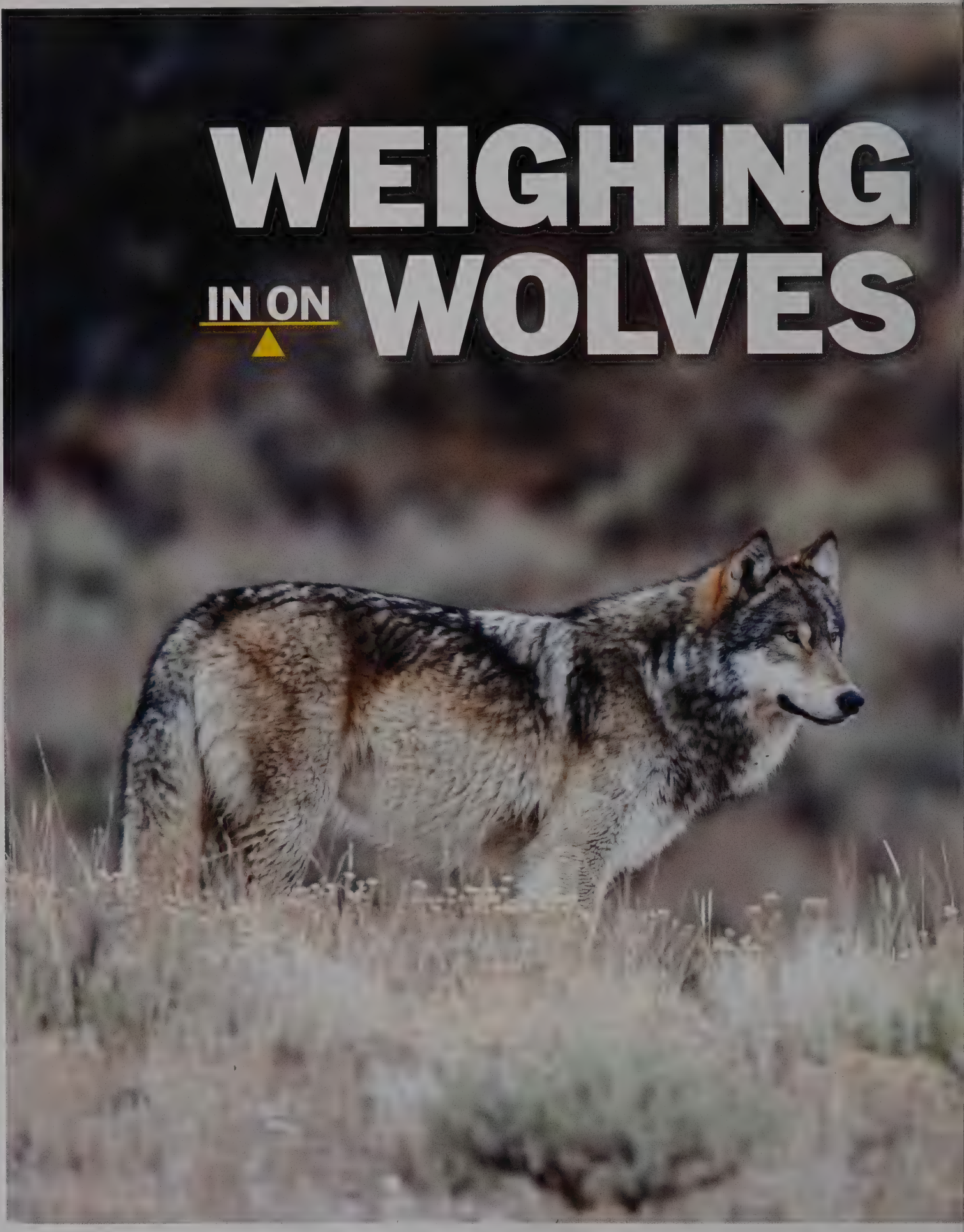
Just as worrisome as the harmful effects of night illumination are what the brightness eliminates: the serenity of night, its breathtaking pallet of stars, and the universal sense of wonder it evokes. Many times I've had the privilege of sharing this with people touring the Rocky Mountain Front. After waiting until nearly midnight to view the summer sky in its nighttime glory, the visitors (generally from big, dark-deprived cities) audibly gasp at their first view of the Milky Way, something that can no longer be seen in two-thirds of the United States. They are overwhelmed by something I call "ancestral awe," that powerful feeling of connectedness to the past, the landscape, and the universe. Across cultures, night is evocative of many things, some polar opposites of each other: fear, safety, vulnerability, security, beauty, and, of course, that final "darkness" all mortals must consider. The natural night sky is a look into eternity as well as a way that people around the globe can witness nature's grandeur. In much of the world, that opportunity continues to shrink with each new neon billboard and illuminated parking lot. We are fortunate here in Montana to still have easy access to the dark sky's beauty and unknowable mysteries.

It's late now, and I've finally crested the low prairie ridge where I began. The timid glow of town is visible and gives me pause. I think about the millions of urban residents unable to enjoy the night sky as we do here, and how meager life would be in a world without natural darkness and the spiritual shelter it provides. Then my gaze is abruptly pulled toward something glowing faintly in the north, and the aurora borealis slowly unfolds, shimmering its green-white veil. I can't help but gasp.

David Cronenwett is a writer and outdoor educator from Choteau.

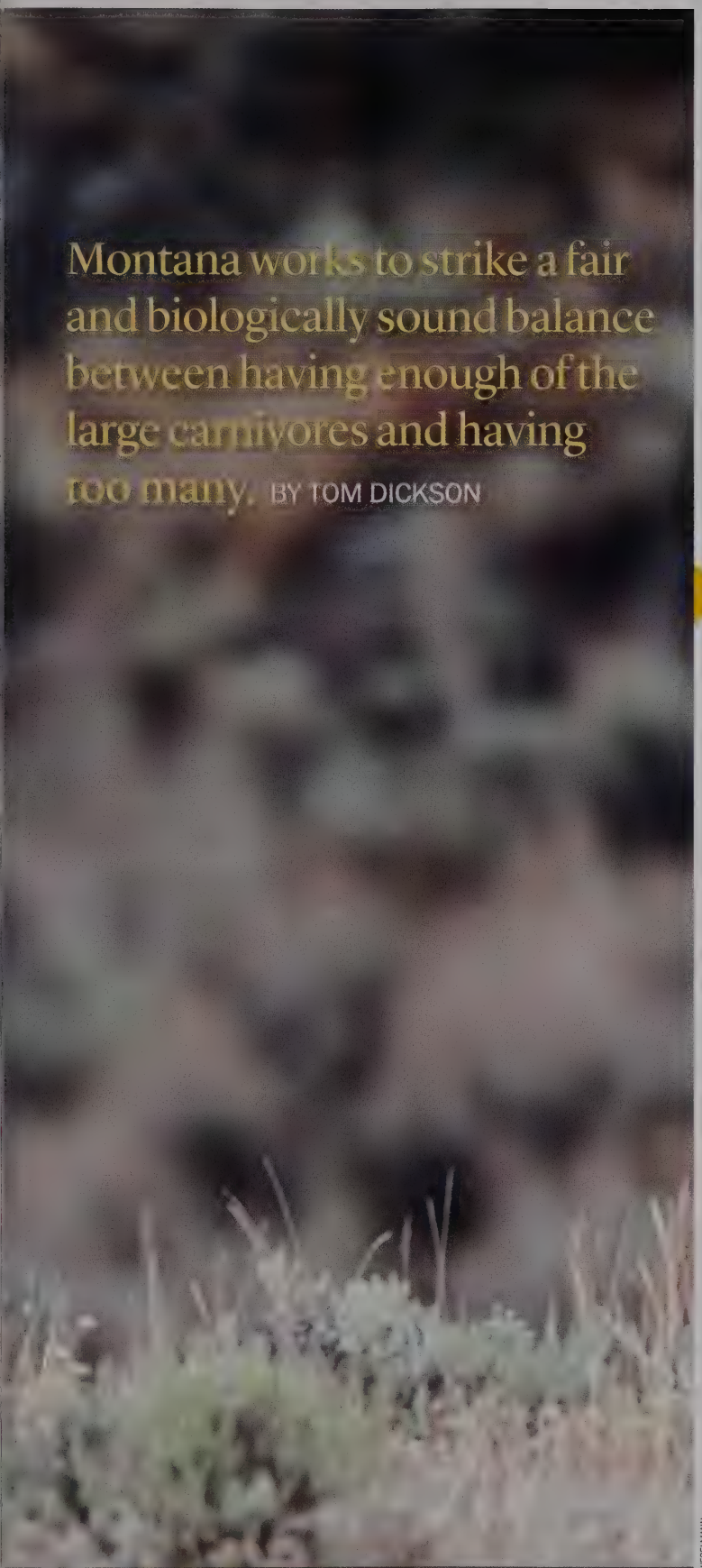
LIT UP Looking north over southwestern Bozeman, just before sunrise.

WEIGHING IN ON WOLVES



Montana works to strike a fair and biologically sound balance between having enough of the large carnivores and having too many.

BY TOM DICKSON



SAME ANIMAL, DIFFERENT LENSES Many hunters see the wolf as competition for elk and deer. Ranchers regard the large carnivore as a threat to livestock. Yet others, like wolf watchers who crowd Yellowstone National Park in winter, when viewing conditions are best (right), consider the wild canid a natural wonder to be cherished and protected.

LEFT: CINDY GOEDDEL; RIGHT: ROBERT J. WESELMANN

DRIVING THROUGH THE FROZEN landscape of Yellowstone National Park's (YNP) Lamar Valley one recent morning, wolf watching guide Nathan Varley slows down and points to several ravens about a mile off. "There it is," he says, pulling over to set up his spotting scope and train it on a recent elk kill, which a few minutes earlier a colleague had told him was in the vicinity. For an hour we watch two wolves feeding on the carcass, a large gray male known to local watchers as "Crooked Ear" and a smaller black female called "Spitfire." The naming fosters anthropomorphizing, admits Varley, but it helps with identification, as do numbers given to about 20 percent of the park's wolves that wear radio collars for research purposes. Several other wolf watchers gather along the road in the bitter cold to view the large carnivores, clearly visible through high-powered optics. Crowded tour buses and minivans operated by wildlife-viewing companies pass by every 15 minutes or so, returning to Gardiner from another elk kill farther up the valley.

Varley, who lives in Gardiner, studied the park's carnivores for several years while earning a doctorate in ecology. But his primary concern with wolves these days is economic, not academic. "Every park wolf that steps over the border into Montana and Wyoming and gets shot is money out of our pocket," says the wildlife guide, who is also vice president of a local group called Bear Creek Council that tries

to increase tolerance for wolves and bison leaving the park. Varley and his wife run Yellowstone Wolf Tracker wildlife tours, one of a dozen or so guiding operations sanctioned by park officials. These kinds of services are at the heart of a thriving wolf watching tourism that a University of Montana study found pumps millions of dollars into counties surrounding the park each year.

That economic argument is just one used by wolf advocates critical of growing hunter and trapper wolf harvests in Montana, Idaho, and Wyoming. Some are like Varley, who has no gripe with wolf hunting elsewhere but wants a kill-free buffer around Yellowstone. Others, often from outside the Rocky Mountain West, want to halt all lethal action on an animal that was classified as federally endangered just a few years ago.

On the flip side are those who demand that Montana kill more wolves, which they say harm ranchers' bottom line and deplete elk and deer herds. "We'd like the state to take much more aggressive measures in certain areas to bring these predator numbers down to a more tolerable ratio with prey populations," says Rob Arnaud, president of the Montana Outfitters and Guides Association. "We've got hunting outfitters around Yellowstone going out of business because of wolves."

Montana Fish, Wildlife & Parks is listening to all sides. The department's job is to ensure there are enough wolves to maintain a healthy population in Montana, as mandated by its mission and federal law. At the same time, it works to limit livestock depredation, maintain abundant deer and elk, and foster public tolerance for wolves.

"Every park wolf that steps over the border into Montana and Wyoming and gets shot is money out of our pocket."

"We've got hunting outfitters around Yellowstone going out of business because of wolves."

It's a balancing act, and, with impassioned interests tugging every which way, not an easy one.

Tom Dickson is editor of Montana Outdoors.

Frustration fuels anger

The wolf has long represented conflicting views of untamed nature. Roman, Norse, and Celtic mythology celebrated wolves, yet the carnivores were feared and persecuted throughout Europe for centuries. Native American tribes revered wolves as guides to the spirit world. The United States nearly eradicated the carnivore with bounties and, later, wide-scale federal government extermination. In Montana alone, "wolfers" killed 100,000 wolves between the 1860s and 1920s, primarily with poison.

Public attitudes toward wolves began to change in the 1970s as part of the growing environmental movement. *Canis lupus*, nearly extinct in the Lower 48, became a symbol of the nation's vanishing wildness. In 1995-96, 66 wolves were live-trapped in Canada and set free in Yellowstone National Park and the wilderness of central Idaho. The goal: Restore wolves to a region where they had almost been eliminated. Western states objected but took some comfort knowing that management authority, which includes regulated hunting and trapping, would revert back to them once the wolf population reached federal recovery goals.

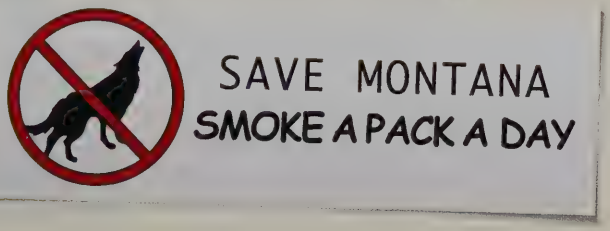
In the first decade after the Yellowstone introduction, the highly prolific carnivores grew rapidly in number and range. By 2001 the regionwide population count surpassed the federal goal of 300 in Idaho, Montana, and Wyoming combined (at least 100 in each of the three states). By 2007 it reached at least 1,500—five times the initial target. Yet as wolf advocates cheered the growth, stockgrowers were reporting more and more livestock losses. Hunters in some areas began seeing fewer deer and elk and attributed the disappearance to growing wolf numbers. With the large carnivores still under federal protection, wolf critics felt powerless to stem the rapid population growth. They grew increasingly vocal, holding rallies, proposing legislation to defy federal rule, and even threatening illegal actions. "Shoot, Shovel, and Shut Up," read one popular bumper sticker.

Anti-wolf furor lessened after 2011, when the U.S. Fish & Wildlife Service (USFWS) removed ("delisted") the Northern Rockies population from the federally threatened and endangered species list. Wolves could now be hunted under carefully regulated conditions. Still, many wolf opponents complained that too many wolves remained in areas where hunters were unable to reduce numbers. Demands grew for the state to kill pups in dens or, as Alaska and Idaho do, employ aerial gunning from helicopters.

FED UP Frustrated that wolf numbers continued to grow far beyond initial federal recovery goals, anti-wolf protesters turned up the volume during the early 2000s. Wolves were finally delisted in 2011.

LEFT: MONTANA FWP; OPPOSITE PAGE: KELLY GORHAM

THE FACTS regarding concerns over Montana's wolf management



▶ PRO-WOLF BELIEF:

"Regulated hunting and trapping is decimating Montana's wolf population."

6X **FACT:** Montana's wolf population is still six times greater than the initial federal recovery goal of 100—a threshold reached in 2001.

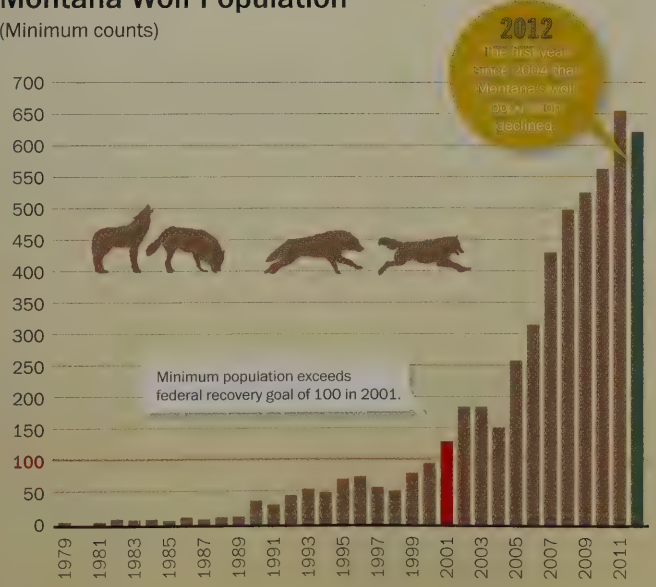
▶ ANTI-WOLF BELIEF:

"Wolves are decimating Montana's elk population."

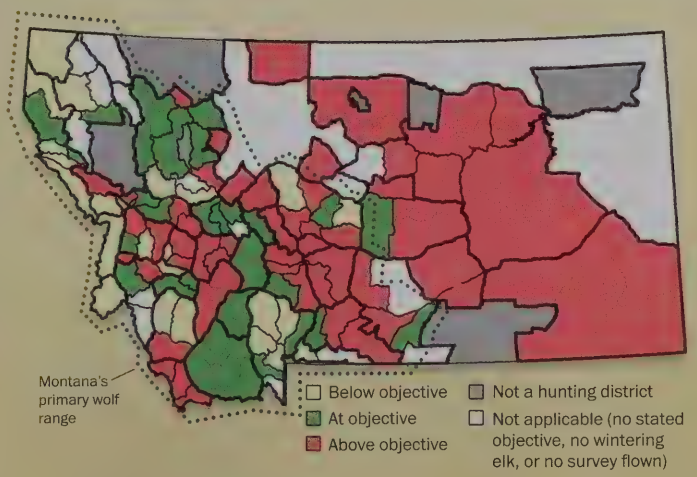
81% **FACT:** Elk numbers are still at or over population objectives in 81% of hunting districts statewide. Numbers remain strong across most of the state's primary wolf range.

Montana Wolf Population

(Minimum counts)



2013 Elk Population Objective Status by Hunting District


Montana's primary wolf range
Below objective
At objective
Above objective
Not a hunting district
Not applicable (no stated objective, no wintering elk, or no survey flown)

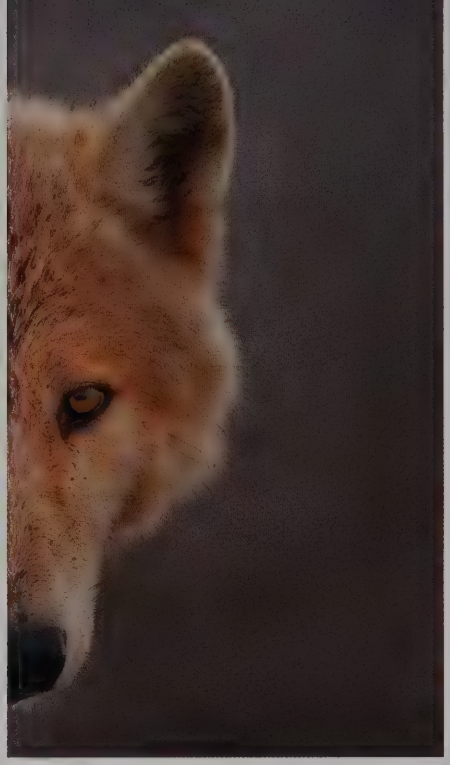
GRAPHICS: *MONTANA OUTDOORS*; SOURCE: FWP

Such radical proposals alarmed wolf advocates. With the species no longer under federal protection but instead subject to state control, they responded by ramping up their rhetoric and protests, just as wolf critics had a few years before. Public comments to FWP skyrocketed, from 500 on the first proposed wolf hunting season to more than 25,000 on the most recent. Most were coordinated e-mail "blasts" coming from outside Montana that denounced all wolf hunting.

Outrage over killings

Much of the outcry from wolf advocates concerns the Yellowstone park wolves. Extensive coverage by the BBC, *National Geographic*, *The New York Times*, and other global media have detailed the carnivores' complex social interactions since reintroduction. Fans throughout the world track the Junction Butte, Blacktail, and other packs on blog posts and Facebook pages maintained by watchers who cruise the park's roads year round. Devotees can see where Tall Gray was spotted last week or learn how 686F is faring in Mollie's Pack, as though the wolves were characters in a reality TV show. Little wonder the Internet lit up this past August after a collared YNP wolf (820F) that had become habituated to humans was killed in Gardiner. "People become attached to these wolves that then leave the park and are shot. They get outraged," says Varley.

Yellowstone's wolf population has declined in recent years, not due to outside-the-park hunting, as some suggest, but mainly from a shrinking elk population. (All hunting is banned within the borders of national parks.) In the late 1980s and early '90s, the northern Yellowstone elk herd was one of the nation's largest. Reintroduced to this prey-rich environment, wolves grew from 41 in 1997 to a peak of 174 in 2003. As park biologists predicted, once elk numbers dropped (due to predation, weather, and liberal elk hunting seasons outside the park) so did the wolf population, which now numbers 86. Hunters have legally killed wolves that wander out of Yellowstone, but far more of the animals have died from wolf-on-wolf attacks, starvation, and disease. Mange alone has killed dozens.



5% Today just over five percent of the 1,600 or more wolves in the Northern Rockies reside in Yellowstone.

6 Montana's wolf hunting season now lasts six months. Hunters and trappers may (though rarely do) take up to five wolves each.

Though the park's wolf decline understandably concerns watchers and guides, "the Yellowstone introduction was not designed to create wolf viewing opportunities or businesses," says Ken McDonald, head of the FWP Wildlife Division. "It was meant as the base for expansion far beyond the park's perimeter. Park visitors focus on individual animals, but here in Montana our responsibility is to manage wolves at a population level."

Wolf numbers in Montana and elsewhere in the Northern Rockies are robust, making the park's packs less significant to the regional population than their popularity would indicate, says McDonald. Today just over 5 percent of the 1,600-plus wolves in the Northern Rockies reside in Yellowstone. The species is thriving across the West and Midwest, despite a recent claim by the Sierra Club that hunting "has driven the gray wolf nearly to extinction." According to the U.S. Fish & Wildlife Service, the Lower 48's wolf population has grown by 50 percent over the past decade to 5,360.

Outlandish claims show up on both sides of the issue. Some wolf critics still insist the carnivores are "wiping out" most of western Montana's elk populations. True, numbers are considerably down in some areas that have especially high wolf densities, notably the upper Gallatin, Blackfoot Valley, and Gardiner areas. But elk numbers remain at or above "population objectives" (what the habitat base and landowners will tolerate) in 81 percent of the state's hunting districts.

Addressing reasonable concerns

Exaggerations aside, most apprehension over wolves is well within reason: A Dillon rancher needs to protect his sheep; a Missoula hunter wants to see elk next November; a Bozeman naturalist desires to live in a state with a healthy wolf population; a Florida tourist hopes her favorite Yellowstone wolf stays free from harm. "We take all reasonable concerns about wolves seriously," says Jeff Hagener, FWP director.

The department notes that livestock losses declined last year thanks to higher hunting and trapping harvest. Also credited are ranchers working with the department's six wolf specialists to protect sheep and cattle using fence flagging (fladry), carcass

CLOCKWISE FROM TOP LEFT: JAIME & LISA JOHNSON; JAIME & LISA JOHNSON; BLUEDOLPHIN.COM; WIKIPEDIA; ARIZONA HISTORICAL SOCIETY; PUBLIC DOMAIN; PUBLIC DOMAIN

HISTORICAL PERCEPTIONS OF WOLVES

In Roman mythology, the twins Romulus and Remus, raised by a she-wolf, found the city of Rome.

For centuries Europeans feared wolves. "Wolves Chasing Sleigh" was a popular subject for painters.

President T.R. Roosevelt declared the wolf a "beast of waste and destruction" as the U.S. embarked on systematic eradication.

In fables and cartoons, the Big, Bad Wolf uses cunning and deceit to trick Little Red Riding Hood, the Three Little Pigs, and other innocents.

Modern fans embrace the wolf as intelligent, sensitive beings restored to their rightful place.

removal, and other measures.

Following reports of wolf predation on the southern Bitterroot Valley's elk herd, the department launched a large-scale investigation in 2011. Researchers recently found that mountain lions are more responsible for elk population declines there than wolves are. What's more, the southern Bitterroot elk herd is rebounding, likely thanks to favorable weather and habitat conditions.

As for criticism that Montana hasn't done enough to control wolf numbers, "FWP fought for years to restore state management authority that includes public hunting and trapping," says Hagener. Because wolves are wary and difficult to hunt or trap, FWP has supported liberalized regulations that now include a six-month season, electronic calls, and a wolf limit of five (a number that very few hunters or trappers actually take).

Montana is working to pare down the population of 600-plus wolves living here. But the state will not drive numbers low enough to trigger federal re-listing under the Endangered Species Act (ESA). "We can keep the ESA at bay only if we continue to show we have adequate regulatory mechanisms in place and are not advocating wholesale wolf slaughter," says McDonald.

In support of wolves, Montana's wolf conservation plan—the document that guides the state's wolf management—recognizes that many people value wolves, the large carnivores play an important ecological role, and the population must remain genetically connected to those in other states and Canada if it is to survive over time. FWP opposes poison, aerial gunning, and proposed legislation classifying wolves as predators that can be shot on sight. The department has created special hunting zones around YNP and Glacier National Park to reduce the chances that a park research wolf will be killed, and it urges hunters not to shoot radio-collared wolves.

"As hard as it might be for some people to believe, allowing Montanans to hunt wolves actually builds tolerance for wolves"

FWP has also committed to keeping the population well above what the USFWS originally deemed sufficient for recovery.

Despite protests from wolf advocates, Montana will continue to allow hunters and trappers to kill wolves. That was part of the recovery agreement. Paradoxically, it's also in the wolf's best long-term interests.

"As hard as it might be for some people to believe, allowing Montanans to hunt wolves actually builds tolerance for wolves," says Hagener. He points out that overall anti-wolf anger in Montana, though still strong in some circles, has eased considerably since hunting and trapping seasons began in 2011. "As long as we can manage wolf numbers at what most Montanans consider an acceptable level, people here will accept having a certain amount of wolves on the landscape along with some loss of livestock and prey animals."

But without regulated harvest, Hagener says, "there'd be much more pressure to treat wolves like varmints that could be shot anytime, year round." Such relentless mortality would drive down Montana's overall wolf population. And it would prevent Yellowstone wolves from moving freely across the region to breed with counterparts in Idaho and northern Montana, threatening that population's genetic health and future survival.

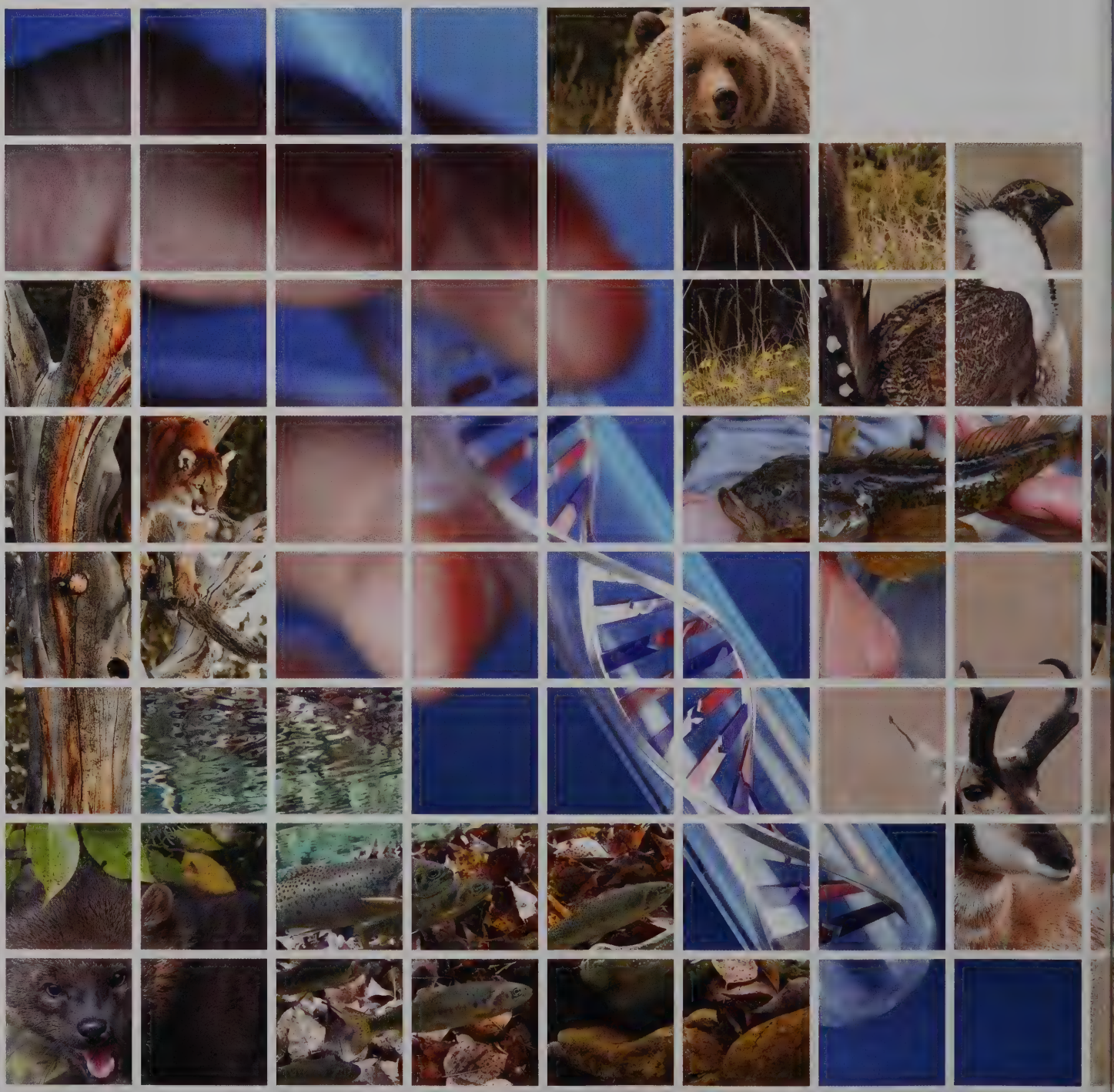
Most people, including Montanans, want wolves to exist in the Northern Rockies. But how many, and where? It should come as no surprise that what is considered "enough" often differs widely between those trying to live their lives on a landscape where wolves live, too, and those watching the drama play out from hundreds of miles away.

EATING OR STEALING? There's no argument that wolves kill prey animals and livestock to survive. Where tempers flare is over how much, if any, of that predation is reasonable.

READING AN ANIMAL'S

DNA science improves fish and wildlife conservation, management, and law enforcement.

BY TED BREWER



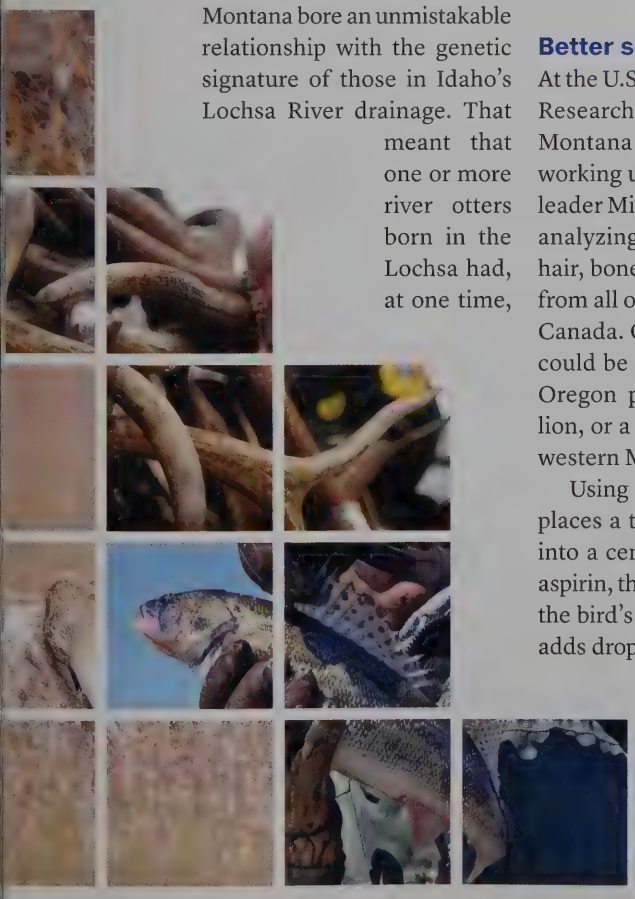
IMAGES: SHUTTERSTOCK, USFWS, MONTANA FWP

"FINGERPRINTS"

In the mid-2000s, University of Montana biological sciences professor Kerry Foresman led a study on river otters in the Upper Clark Fork drainage. The aim was to learn if the otter population, which had taken a severe hit during decades of heavy metal contamination from old upstream mining waste, was rebounding, as suspected. And, if so, where the otters might be coming from.

Foresman asked Montana Fish, Wildlife & Parks for tissue samples from otters taken by trappers in the drainage. He also collected samples of otters trapped in neighboring river drainages, including in Idaho. DNA from the samples would tell Foresman where these otters and their recent ancestors might have originated.

The analysis revealed something intriguing: The genetic signature from some otters trapped in western Montana bore an unmistakable relationship with the genetic signature of those in Idaho's Lochsa River drainage. That meant that one or more river otters born in the Lochsa had, at one time, traveled several miles by land, climbing Lolo Pass in the northern Bitterroot Mountains and dropping down Lolo Creek to the Bitterroot River.



"People have suggested [that a migration by land] could occur," says Foresman. "They've seen otters walking through the woods, but there's never been any evidence before this that otter dispersal over mountain ranges in Montana resulted in breeding and genetic exchange."

DNA analysis has proved to be a vital new tool that allows wildlife and fisheries researchers to obtain more information faster. The process identifies not only an animal's species and sex, but also the individual and its relatedness to other individuals in a certain area or across a region. "Because of the DNA technology, I can finally answer a lot of questions I started asking 20 years ago," Foresman says.

Better science, better decisions

At the U.S. Forest Service's Rocky Mountain Research Station on the University of Montana (UM) campus, lab technicians working under conservation genetics team leader Michael Schwartz are extracting and analyzing DNA from blood, tissue, scat, hair, bone, and other types of samples sent from all over the United States and parts of Canada. On any given day, the technicians could be analyzing DNA samples from an Oregon pika, a South Dakota mountain lion, or a fisher that lived 100 years ago in western Montana.

Using tweezers, lab tech Kelly Morgan places a tissue sample from a sage-grouse into a centrifuge tube. About the size of a aspirin, the sample is part of a study gauging the bird's genetics in eastern Montana. She adds drops of purified soap and enzymes to the tube and places it in a heating block overnight. This process breaks open the tissue's cells and releases the deoxyribonucleic acid, or DNA, from the cells' nuclei. After extracting the DNA strands, lab technicians then sequence the precise order of the sage-grouse's genes, creating a printout that looks like an enlarged barcode. This is the individual animal's DNA "fingerprint" or "signature."

Before DNA analysis became a tool of fish and wildlife studies, biologists had to physically capture and mark animals to estimate, for example, how many mountain lions inhabit the Blackfoot River drainage or which individual grizzly bears reside in the Northern Continental Divide Ecosystem. Both species are elusive and often live in hard to reach areas. Someone trying to tally the number of individuals in a population could easily wind up counting the same lion or bear twice (if it hadn't been marked) and many not at all. Projects relying on physical capture could take up to a decade, with extremely high costs, making widespread application unfeasible.

Lacking accurate abundance and density estimates, Montana Fish, Wildlife & Parks wildlife officials sometimes struggled to determine whether certain populations were declining (requiring special protections) or increasing (able to withstand greater hunting or trapping harvest). "These advances in molecular genetics and new, faster methods for extracting DNA give us a much more accurate sense of how many animals are out there," says Justin Gude, head of wildlife research for FWP.

> "Because of the DNA technology, I can finally answer a lot of questions I asked 20 years ago."

As an example, Gude points to the finding in January by FWP and UM researchers that the estimated number of adult mountain lions in Montana's southern Bitterroot Valley is two

WELCOME TO MONTANA In the mid-2000s, researchers found Idaho otter DNA in otters living in western Montana. That meant one or more otters born in the Lochsa Basin had once crossed Lolo Pass in the northern Bitterroot Mountains and dropped down Lolo Creek to the Bitterroot River.

to four times greater than previously thought. "Our earlier estimates came from radio telemetry, a method that could give a minimum count only for resident lions that didn't disperse widely," he says. "But now, using DNA analysis, we've been able to estimate the size of the Bitterroot population with far greater accuracy in a way that also includes dispersing and transient lions."

Maybe the most crucial technological advance in DNA analysis has been polymerase chain reaction (PCR). This biochemical technology enables laboratory technicians to make millions of DNA copies, much like our bodies do, from the few strands of DNA that researchers extract from scat, hair, vomit, feathers, eggshells, bone, and even fish cells floating in a scoop of creek water. Before PCR, scientists relied entirely on blood and tissue samples for obtaining DNA. That required finding and then obtaining samples directly from the animals that biologists were studying, a particular challenge with secretive species and large predators.

PCR has made collecting DNA much less invasive and obtrusive, allowing researchers to collect far more samples than before. Now biologists often need only gather scat from the landscape (sometimes found with the help of specially trained dogs) or collect samples from snag stations, in which barbed wire strung around stinky bait catches hair of curious bears and other wildlife.

Because DNA shows which particular lion or other animal left the scat or hair, researchers can use statistical models to count the number of individuals in an area, providing wildlife managers with reliable abundance and density estimates.

Aiding bull trout and westslope cutts

DNA analysis for fish and wildlife grew out of a federally funded project that began in 1990 to "map" the human genome, the complete set of genetic information for *Homo sapiens*. "The technology starts in human medicine, advances to human forensics and population genetics, and within a couple of years we're adapting it to wildlife," Schwartz says. "We draft behind the Genome Project, behind the medicine. We just pick the technology off."

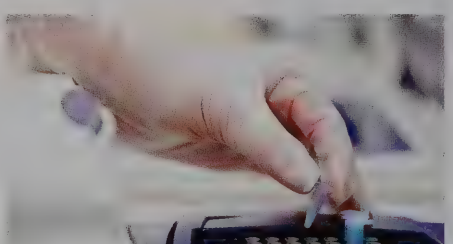
Fisheries scientists also are putting the new technology to good use. Biologists with the USFWS, working with FWP, Avista Utilities, and others, are capturing migrating adult bull trout below Cabinet Gorge Dam on the Clark Fork River. They then use "rapid genetic assessment" to determine how far above the dam to move the native fish so the trout are more likely to spawn in natal waters.

Two other bull trout conservation efforts using DNA analysis are in the Clearwater Chain of Lakes in the lower Seeley-Swan Valley and in the Blackfoot River drainage. There, FWP biologists are sampling bull trout in spawning tributaries to learn where fish that live in the various lakes and the mainstem Blackfoot River originate. "This helps us identify the most critical spawning tributaries for conservation," says Robb Leary, FWP fish conservation geneticist.

FWP biologists also use DNA analysis to identify where the purest strains of westslope cutthroat live. Leary says the agency can then focus limited conservation dollars on those critical habitats rather than on watersheds where native fish are too genetically diluted by hybridization with rainbows.

Biologists with FWP and the Rocky Mountain Research Station have developed genetic "markers" for native cutthroat trout, native redband trout, and non-native rainbow trout. This gives them a better idea of how the various species use their range, where they intersect, and how to prevent hybridization that threatens the genetic purity of indigenous species.

For instance, Bostwick Creek in the Gallatin drainage historically contained only pure-strain westslope cutthroats. Recently cutthroats that have hybridized with rainbow trout ("cutt-bows") have entered the creek from downstream. To conserve the native fish, biologists are capturing and tagging trout, from which they take tissue samples to send to a laboratory. "If the samples contain genetic markers showing that the trout are hybrids, biologists can go back



AN ENTIRE BEAR IN A SINGLE HAIR Using what's known as PCR biochemical technology, scientists produce millions of DNA copies from just a few strands of DNA in a hair, feather, or fish scale to identify an animal's identity and genetic makeup.

Ted Brewer is a writer in Helena.

and remove those particular fish from the stream population," Leary says.

DNA analysis also helps FWP nab poachers. "We regularly see DNA matches between the remains of poached carcasses and various items in a suspect's possession," says Mike Korn, assistant chief of the FWP Enforcement Division. For instance, in spring 2012 several elk were illegally killed near Thompson Falls, the meat cut out and carcasses abandoned. By matching DNA from tissue at the crime scene with meat he later obtained, local warden Tom Chianelli obtained a search warrant that resulted in three poachers eventually confessing to the crime, permanently losing their hunting privileges, and paying $18,000 in fines and restitution. In another case, a headless bull elk carcass was found near Hardin. Human DNA on a rope-handled knife discovered at the crime scene by game warden Shane Yaskus matched that of a local criminal, who pled guilty to illegally possessing a bull elk.

> "We draft behind the Genome Project, behind the medicine. We just pick the technology off."

Specimen from 1896

DNA analysis is also allowing scientists to better understand the lives of wildlife that lived here hundreds or even thousands of years ago. By examining animal remains in ancient rodent dens, researchers are learning about short-faced bears, saber-toothed tigers, and woolly mammoths. DNA science has even upended a long-standing belief about Montana's fishers.

For much of the 20th century it was common knowledge that this cousin of the wolverine was extirpated (locally extinct) in Montana. Biologists attempted to restore fishers in the 1960s by releasing several dozen from British Columbia in Idaho and western Montana. Then, from 1989 to 1991, FWP translocated another 110 fishers, from Minnesota and Wisconsin, to Montana's Cabinet Mountains.

Some 20 years later, one of Kerry Foresman's graduate students (and current FWP wildlife biologist), Ray Vinkey, evaluated the success or failure of the fisher translocations. As Foresman had done with the otter study, Vinkey asked Schwartz's lab in Missoula to analyze DNA from tissue samples of legally trapped fishers stored by FWP. All the fishers across western and northwestern Montana possessed genetic signatures indicating that they descended from fishers reintroduced from British Columbia and the Midwest. However, fishers from the mountains in western Montana also had genes not present in either of the source populations.

So where did they come from?

Working on a hunch, Vinkey and Schwartz decided to compare the trapped fishers' DNA with that from a fisher skull at Harvard University, a specimen originally collected in Montana near Lolo Pass in 1896. Schwartz flew to Harvard and brought back the specimen's nasal turbinate bone, from which he found enough trace blood to extract the DNA. His analysis indicated that fishers in western Montana mountains may be part of a native, historical population whose ancestors include the Montana fisher at Harvard. "We thought fishers were totally extirpated from the state," Foresman says. "Now we know they probably weren't and that we have a unique Montana population."

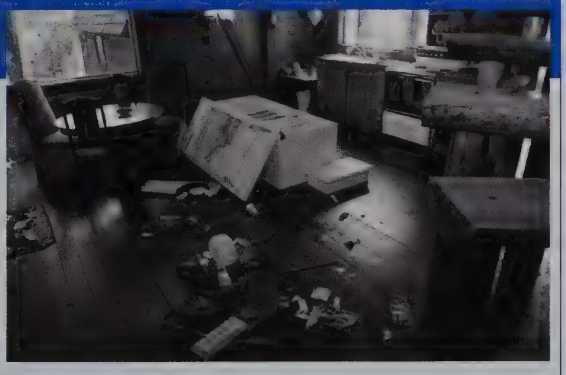
No doubt even more surprises about Montana's fish and wildlife await discovery in the DNA that scientists are right now collecting and analyzing.

SCIENCE SPARES MARAUDING BEAR LOOK-ALIKES

Had it not been for DNA fingerprinting, several innocent grizzly bears might have been unjustly euthanized for the misdeeds of one notorious bear, the Albino Basin grizzly.

FWP first recorded the infamous bear's DNA in 2004, when he wandered into a trap in the Swan Valley and was radio-collared. After shedding his collar, he appeared on the department's radar (and gained his name) a year later when he left behind fur in a hair snare that researchers had set in Albino Basin, deep in the Bob Marshall Wilderness.

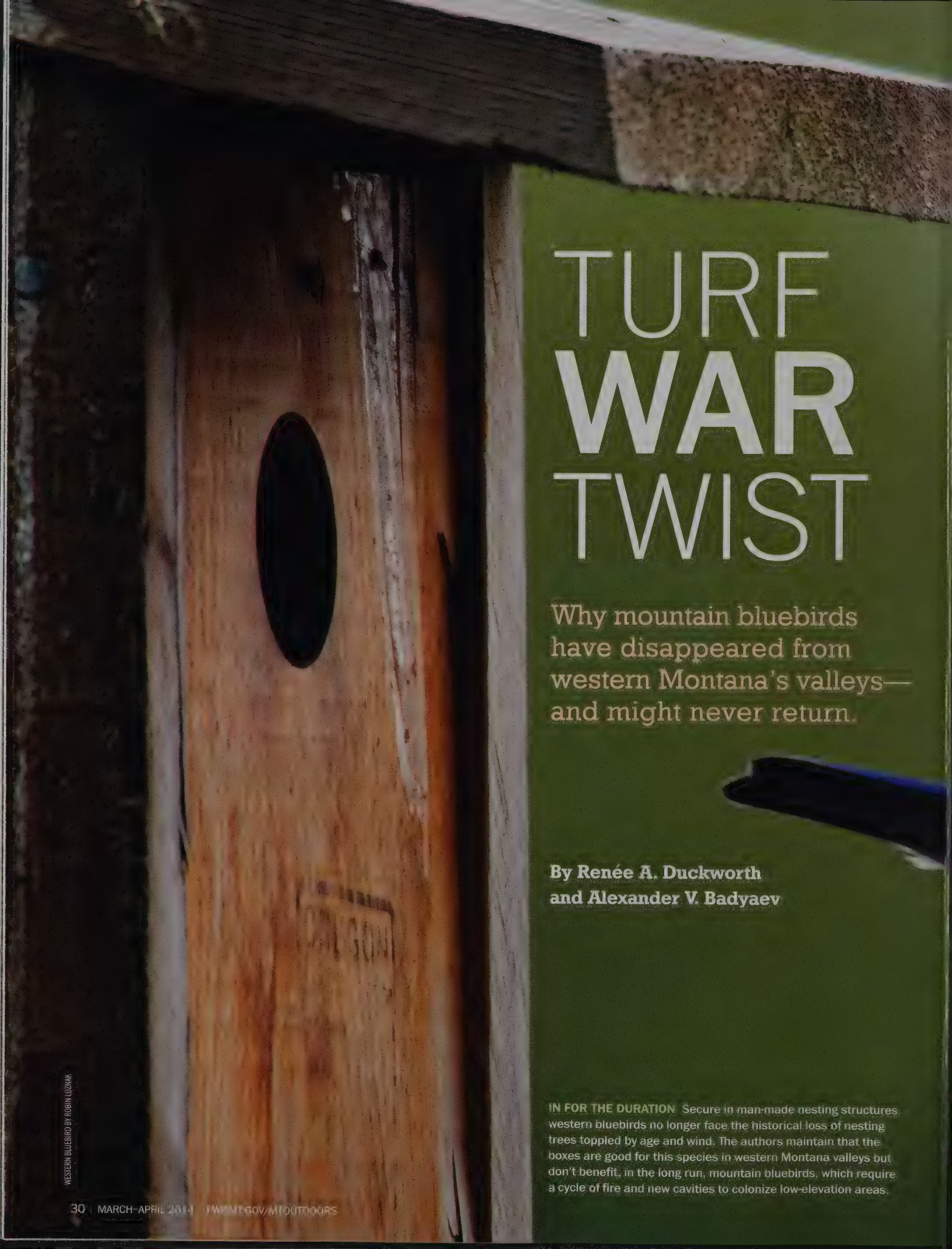
From 2006 to 2009, FWP biologists investigating a series of cabin break-ins throughout the Bob Marshall and Swan Valley found hair and blood they were able to identify, through DNA fingerprinting, as belonging to the Albino Basin grizzly. In 2007 alone, he broke into at least ten different cabins in the Swan Valley near Condon. Unlike most bear burglars, he didn't return to crime scenes, thereby evading traps FWP set near the break-ins afterward.



CRIME SCENE A cabin raided by the Albino Basin grizzly. The bear, known to focus on buildings containing white refrigerators, was eventually captured. After identification using DNA analysis, the grizzly was euthanized for the sake of public safety.

At various times that same year, grizzly specialist Tim Manley caught four male suspects whose paws were the same size as the tracks left at the vandalized cabins. Because FWP is obligated, for the sake of public safety, to euthanize bears that break into places where people live, biologists might have had to kill one or more of those grizzlies. But DNA analysis confirmed that none of the hair and blood of the four bears matched what was found at the break-ins, so Manley was able to release them.

The 20-year-old Albino Basin grizzly was finally tripped up in 2009, when he returned to the scene of his latest crime and landed in a trap Manley had set. A full body mount of the infamous grizzly is on display at the FWP regional office in Kalispell. Visitors are welcome.



TURF WAR TWIST

Why mountain bluebirds have disappeared from western Montana's valleys—and might never return.

By Renée A. Duckworth and Alexander V. Badyaev

IN FOR THE DURATION Secure in man-made nesting structures western bluebirds no longer face the historical loss of nesting trees toppled by age and wind. The authors maintain that the boxes are good for this species in western Montana valleys but don't benefit, in the long run, mountain bluebirds, which require a cycle of fire and new cavities to colonize low-elevation areas.

WESTERN BLUEBIRD BY ROBIN LOZNAK

One morning in March 1999, just as he did so often during the previous 50 years or so, the late Joe Waldbillig—a cattle rancher and self-taught naturalist—was driving his pickup down the snowy road bisecting his western Montana ranch. Ranging in elevation from 4,000 to 5,000 feet, the ranch was a haven for mountain bluebirds, and every day through early spring Waldbillig drove around the valley looking for signs of the birds' return as indication that the worst of winter was over.

But that morning, much to his surprise, he came across a bluebird species he had never before seen on his ranch: an industrious male western bluebird, inspecting nest boxes along the fence.

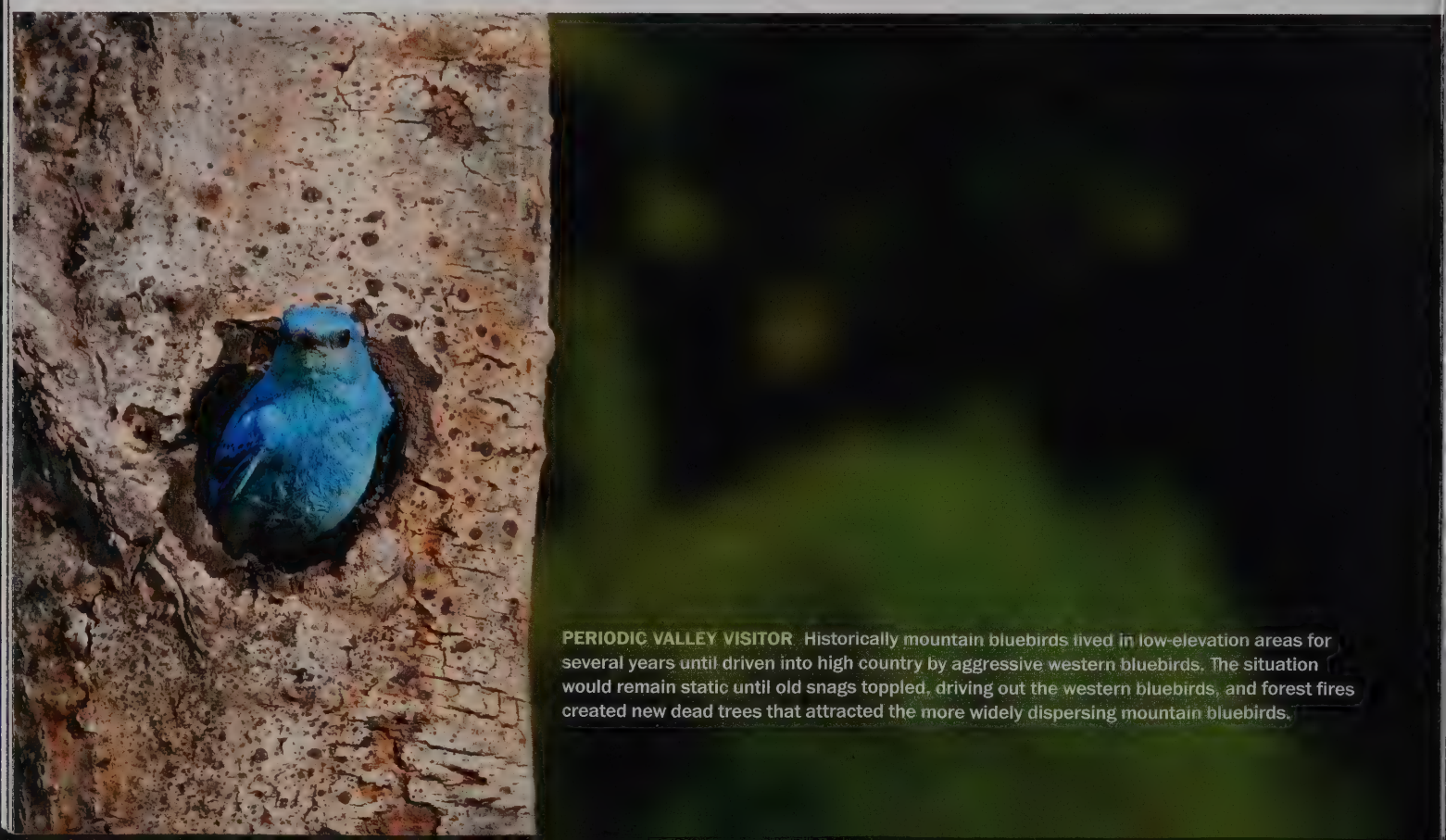
It was a preview of momentous changes. In just five years, Waldbillig would witness on his ranch the near complete takeover of mountain bluebirds by the newly arriving western bluebirds. Over the next decade, such stories of rapid replacement of one bluebird species by the other would repeat itself over and over on our 15 western Montana study areas, which included the Waldbillig ranch, where we monitored these remarkable relationships. Since 1995 we have been investigating competitive interactions between mountain bluebirds and western bluebirds to understand the mechanisms underlying these dramatic changes in distribution. We learned that the historical cycle in which the two bluebird species displace one another every 20 or so generations has been disrupted. And the cause, ironically, has been the creation and maintenance of new nesting habitats.

FIRE-INDUCED CYCLE

Historically in Montana, western bluebirds and mountain bluebirds more or less coexisted in the forested river valleys west of the Continental Divide (another species, the eastern bluebird, lives east of Great Falls).

The relationship worked like this: Bluebirds nest in tree cavities but, unlike woodpeckers, cannot make their own. After a wildfire, woodpeckers colonize burned areas, and, in less than a year, numerous cavities in dead and decaying trees provide prime nesting real estate for bluebirds.

The first to arrive are mountain bluebirds, more wide-ranging than westerns and able to find new habitat quickly. Then the more aggressive, but less mobile, western bluebirds arrive and outcompete the mountain bluebirds for nest sites. The mountain bluebirds retreat to the mountains, where they can survive but western bluebirds can-



PERIODIC VALLEY VISITOR Historically mountain bluebirds lived in low-elevation areas for several years until driven into high country by aggressive western bluebirds. The situation would remain static until old snags toppled, driving out the western bluebirds, and forest fires created new dead trees that attracted the more widely dispersing mountain bluebirds.

1. Periodic forest fires kill low-elevation trees...
2. ...the cavities of which are excavated by woodpeckers and then colonized by widely dispersing mountain bluebirds...
HISTORICAL 20- TO 30-YEAR CYCLE
DISRUPTION
Bluebird nesting boxes create permanent homes for western bluebirds. With no new valley fires to start the historical cycle anew, mountain bluebirds are now restricted to higher elevations.
3. ...which are driven into the mountains by the aggressive type of western bluebirds...
4. ...which are eventually joined by the peaceful, home-loving type of western bluebirds, until....

not, waiting for the next cycle of valley wildfire to re-set the process and start over. This went on for thousands of years.

But starting around the late 1930s, the western Montana river valley landscape changed more drastically than at any time since the last ice age. Many bottomland forests were logged and replaced with lush fields of wheat, alfalfa, and other crops. Forest fires were suppressed. Populations of western bluebirds, a species generally confined to lower-elevation valleys, were devastated by the loss of nesting cavities. By the mid-1940s they had nearly disappeared from Montana. Although mountain bluebirds also lost nesting sites, they had evolved to also use habitats at higher elevations, where forests remained largely intact.

In the early 1970s, conservation-minded Montanans began an ambitious effort to restore low-elevation bluebirds by nailing wooden nest boxes to fence posts. Over the next several decades, volunteers with the nonprofit group Mountain Bluebird Trails placed more than 8,000 nesting structures along what are known as bluebird "trails"—five or more boxes placed roughly 100 to 300 yards apart, often along highways and country roads.

As hoped, bluebird populations began to recover. First mountain bluebirds reclaimed their historical lower-elevation areas. Then western bluebirds, which had retreated to bottomland refuges farther west and south, began to re-colonize their historical Montana range. Just as in times past, the two bluebird species were back.

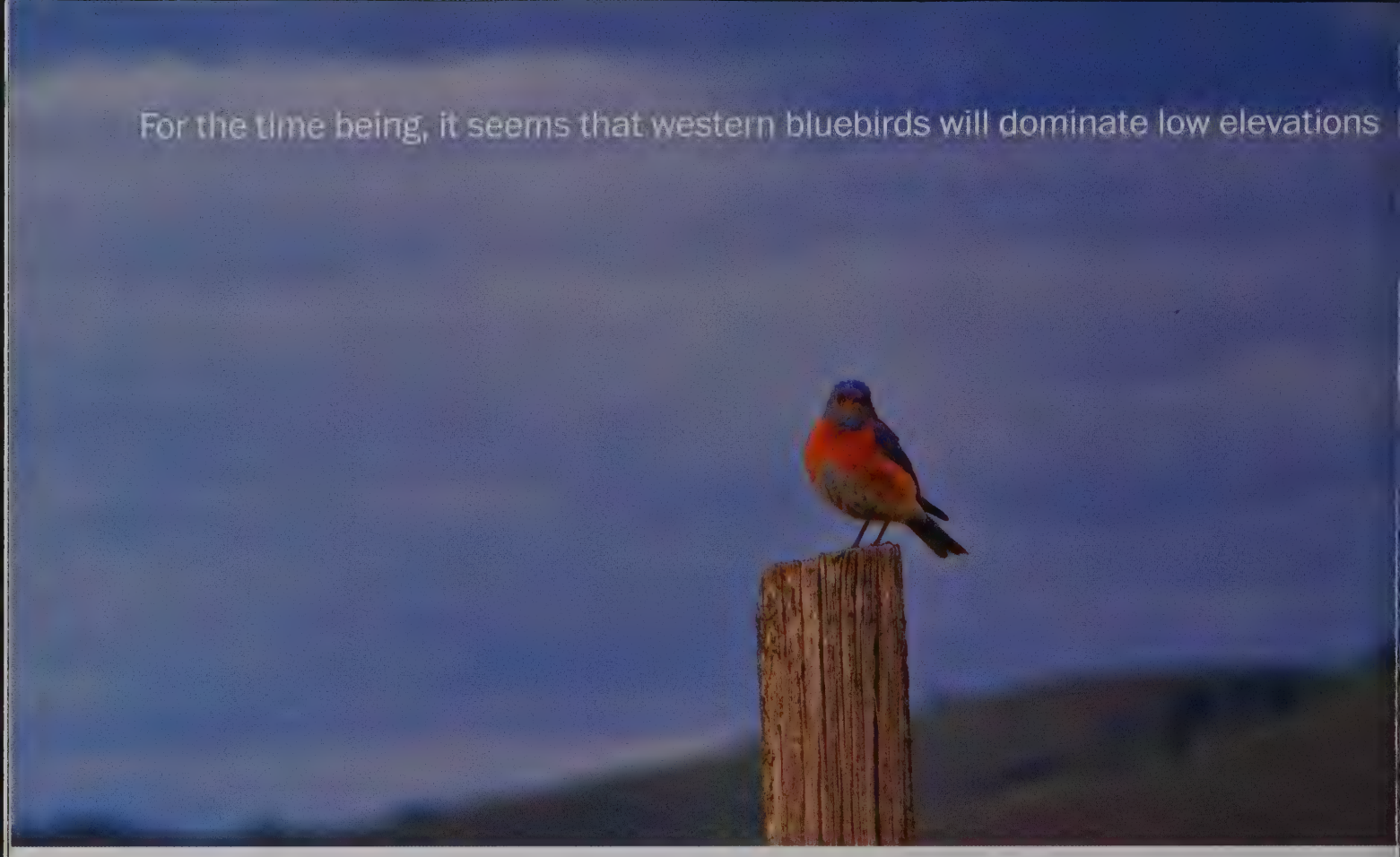
WITNESSING HISTORICAL PATTERNS

What was so exciting for us as scientists was the opportunity provided by the bluebird boxes to observe the patterns of historical colonization and competition between the two species. It was as though the slate had been wiped clean and the birds had to reform their relationships before our very eyes.

We documented how newly arriving western bluebirds started to rapidly replace mountain bluebirds in the valleys of western Montana. In only 15 to 20 years, we watched many of our research sites go from no bluebirds, to 100 percent mountain bluebirds, to 100 percent western bluebirds. When we conducted a census of nesting bluebirds in a popular recreation area near Missoula in the early 1990s, all but one breeding pair were mountain bluebirds. By the early 2000s, the mountain bluebirds were gone, completely replaced with a much higher density of western bluebirds. Five years ago, the western bluebird was a rare visitor in the Blackfoot-Clearwater Wildlife Management Area near Ovando. Today the bird is common throughout the entire Blackfoot Valley.

With trees no longer dominating the valley floors as in the past and no periodic re-setting of the cycle by natural wildfires, the dynamics of coexistence between these two species have fundamentally changed.

OPPOSITE PAGE AND BLUEBIRD BOX PHOTOS: ALEXANDER V. BADYAEV; HISTORICAL CYCLE ILLUSTRATION SOURCE: SHUTTERSTOCK.COM



We set out to find out why western bluebirds are so successful at displacing mountain bluebirds and found an important behavioral difference. Western bluebirds are more aggressive and also breed at higher densities. Once they arrive in an area and start to breed, they crowd out mountain bluebirds. This, we discovered, is because the westerns have two distinct behavioral strategies that allow them to successfully colonize habitats newly created by fire and, at the same time, maintain previously established populations.

The species is what's known to biologists as a "facultative cooperative breeder"—meaning that some adult offspring postpone breeding for a year or two to help their parents and relatives raise nestlings. In any population, a young male western bluebird has two choices—either assist his parents in raising their young and then inherit a part of their territory (and thereafter nest near his birthplace), or disperse and compete for a territory in a new area. We found that the strategy a male pursues depends closely on his aggressiveness. Belligerent males are more likely to leave their home ground and disperse to new areas to breed, while peace-loving males remain in their natal population and eventually acquire a territory near relatives.

Dispersing to new areas with a low density of other western bluebirds means that aggressive males acquire larger territories than they would have obtained in a crowded natal area. And nonaggressive males, despite being poor competitors, can still obtain a territory from their parents and start a family of their own if they stay near their birthplace.

What's more, the gentle males are superb providers, something essential during late-spring snowstorms that are common in Montana and the chief cause of bluebird egg and nestling mortality. Because the female must stay on the nest to keep eggs or nestlings warm during the cold, she can't forage on her own. Nonaggressive males bring her nearly all her food during these times, and consequently the family's broods tend to survive the nesting season storms.

Aggressive males, on the other hand, hardly ever feed their mates, so their nests rarely survive late-spring cold snaps. This greatly limits the western bluebird's ability to establish in a new area until enough mellow males establish themselves in the population to ensure a secure base from which the bold males can continue dispersing.

Historically, the combination of aggressive explorers and nurturing settlers enabled the western bluebird to colonize new areas and displace the more widely dispersing mountain bluebirds that had arrived in newly burned areas before them. But eventually, old trees with cavities would topple while new live trees without cavities would grow. Lacking nesting habitat, bluebirds of both species would be forced to search for new patches of habitat elsewhere, and the

Renée Duckworth (left), an ornithologist and ecologist at the University of Arizona, has been studying Montana bluebird coexistence dynamics for two decades. Alex Badyaev, an evolutionary biologist at the University of Arizona, divides his time between long-term field research projects in northern Montana and southern Arizona.

Great catch: one year only $12. Subscribe today!

YES! I'd like a year (six issues) of *Montana Outdoors* for just $12.

My/Donor Information: (Required for gift subscription)

Name

Address

City State Zip

Select: 1 Year *6 /$12* 2 Years *12 /$20* 3 Years *18 /$27*

Send a Gift to: (Please print)

Name

Address

City State Zip

Select: 1 Year *6 /$12* 2 Years *12 /$20* 3 Years *18 /$27*

Payment enclosed Bill me later

Best Deal!

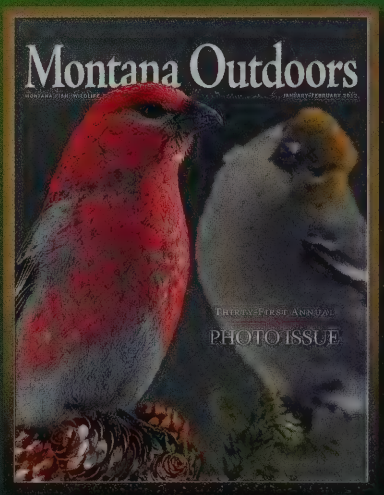
Add $3 per year for Canadian subscriptions.
All other foreign subscriptions are $48/year, paid in advance

For faster service, subscribe by phone: **(800) 678-6668**
Or subscribe online: **fwp.mt.gov/mtoutdoors**

U14B

Place
Stamp
Here

MONTANA OUTDOORS
MONTANA FISH WILDLIFE & PARKS
930 W CUSTER AVE
PO BOX 200701
HELENA MT 59620-0701



Don't miss
the photo issue.
SUBSCRIBE TODAY!

and mountain bluebirds will be restricted to the high country.

Is there a way to re-set the historical cycle so that mountain bluebirds might make their way back to the valleys of western Montana?

cycle would play out all over again. Mountain bluebirds would find new fire-created nesting sites first, and then the aggressive type of westerns would start to displace them. Over time, once mountain bluebirds were completely gone, the peaceful type of westerns would join the bolder birds—until the next fire re-set the cycle once again.

These fire-induced dynamics began to change as farms and ranches reshaped Montana and natural nesting cavities, created by wildfire, were replaced with thousands of more or less permanent nest boxes. Unlike natural cavities, nest boxes are a "constant habitat." With trees no longer dominating the valley floors as in centuries past and no periodic re-setting of the cycle by natural wildfires, the dynamics of coexistence between these two species have fundamentally changed.

BOXED OUT

Without question, nesting boxes have been a boon to bluebirds. Without them, we'd see very few western bluebirds in Montana. But they have had unintended consequences. The constant nature of the man-made structures, replaced by bluebird fans as soon as they break down, has disrupted the natural cycle of repeated colonization. Many lower-elevation valleys in western Montana are now home to stable populations of western bluebirds that have permanently replaced mountain bluebirds. For the time being, it seems that western bluebirds will dominate low elevations and most mountain bluebirds will be restricted to high country.

Why can't western bluebirds take over the higher elevations, too? Like the peaceful type of western bluebird male, the male mountain bluebird is a great provider, allowing his and his mate's nest to survive late-spring snowstorms, more common at 6,000-foot elevations and higher. The peace-loving western bluebird type could likely survive in the mountains, thanks to the male's food-delivery service to his nesting mate. But it would need the aggressive type to drive out mountain bluebirds beforehand, as occurs in low-lying areas. Unfortunately for the species, the eggs or nestlings of the pushy western male and his mate quickly perish in the harsh mountainous conditions. The western bluebirds' Achilles' heel—the inability of aggressive males to feed their incubating and brooding females during late-spring snowstorms—creates a safe haven for mountain bluebirds at higher elevations.

Is there a way to re-set the historical cycle so that mountain bluebirds might make their way back to the valleys of western Montana? Probably not—at least not in a way that mimics natural forest succession.

But there is a way for these delightful bird species to coexist. Some nest boxes could be installed 300 yards or farther apart. Mountain bluebirds don't stick around when western bluebirds are too close. But if mountain bluebirds can stay far enough away from western bluebird boxes, they won't leave. An ideal bluebird trail in western Montana, in areas where both species still occur, would have boxes placed at varying distances. Because bottomland forests and accompanying wildfires are a thing of the past, this might be the only way for people to enjoy seeing both species of these cheery, charismatic birds in the same general area.

CLOCKWISE FROM BOTTOM LEFT: ALEXANDER V. BADYAEV; ALEXANDER V. BADYAEV; WESLEY M. SARMENTO

Leaves of Bone

By Bruce Auchly

©E.R.JENNE

Did you hear that? It was the sound of an elk antler dropping on a windblown, grassy hillside.

Bull elk are shedding their antlers this time of year, much to the delight of that human subspecies, the inaptly named "horn" hunter.

A mature bull elk's mammoth headgear, weighing as much as 40 pounds, takes about five months to grow. That means within a week or two after an elk drops its old antlers, the two bumps (pedicels) atop its head start to bulge, then begin to grow into what hunters drool over six months later.

Antlers are fascinating feats of nature, the only mammalian appendages capable of complete regeneration. Some amphibians can regrow a severed tail or limb. Not so mammals, except in the case of antlers.

For members of the deer family, antlers are both weapons and status symbols (think male supremacy). For humans, antlers are sources of fascination and trophies. In spring, antler afficionados hunt for "sheds" in winter range where elk congregate until greenup. State wildlife management areas generally open for what are called "horn hunts" in mid-May.

Biologically, antlers are much different from horns. Antlers grow only on male members of the deer family, with the exception of female caribou, which grow them, too. Horns, carried by bison, mountain goats, and bighorn sheep, are found on both sexes.

Antlers, made of solid dead bone and often branched, are shed annually (like deciduous tree leaves). Horns come from layers of converted skin (epidermal) cells and are permanent (like evergreen needles). So often the exception, pronghorns—male and female—shed and re-grow a sheathlike covering each year. Though called horns, the pronghorns' headgear isn't the same as those on Montana's other horned critters.

What causes some but not all deer or elk to grow enormous antlers? Though genetics and nutrition play a role, the biggest factor is age.

The older the buck or bull—up to a certain age—the larger the headgear. Bull elk usually grow their first set of antlers, called spikes, when they are a year and a half old. A two-year-old may have three to six points on each antler, and a mature bull age seven and older will often have six points or more.

From age three and up, the antlers often become thicker and heavier rather than grow longer or add more points. And if a bull reaches old age—say eight or older—his antlers actually decline in size and mass from previous years.

No matter what the size, antler growth happens in spring and summer. Triggered by increasing daylight hours, antler development begins when sex hormones such as testosterone are at their lowest levels. The growing bone is covered by blood vessels, nerves, and fine, velvet-like hair appropriately known as velvet. The rise of the animal's testosterone levels near summer's end causes the antler bone to die and shed the velvet covering. The antlers are then ready to use for fighting and attracting females, coinciding with the peak of breeding: mid-September for elk, mid- to late November for deer. When cold weather arrives, testosterone levels decline, eventually causing the headgear to fall off by winter's end. Within weeks or even days, the process begins anew.

That miracle of regenerating enormous headgear on a male moose, elk, or deer is starting right about now.

Bruce Auchly manages the FWP regional Information and Education Program in Great Falls.

Hoary Bat

Lasiurus cinereus

By Susie Wall

With a wingspan stretching 15 to 16 inches and a total body length of 5 inches, the hoary bat is the largest bat in the United States. Its long, narrow wings make it one of the fastest bats, too. Due to its large size and dense fur coat, the hoary bat is also the most hardy, hunting when the thermometer drops to as low as 32 degrees (a temperature that puts most other bat species into a stupor).

Appearance

The hoary bat is named for its grizzled (grayish-white) coat and furred "pinnae," or outer ears. The wrists and shoulders have white patches, the throat sports a bright yellow patch, and the ears are short and rounded. These characteristics make it easy to differentiate the hoary bat from other species if you are lucky enough to spot one. The wings of most other bats in Montana are hairless and their ears are long. What's more, "the fast, straight flight of the hoary bat makes it easy to identify on the wing," writes Kerry Foresman, University of Montana emeritus professor of biological sciences, in his book *Mammals of Montana*.

Habitat and Range

In North America, few bat species are more widespread than the hoary. It is found throughout Montana, though not in high numbers and mainly in coniferous and deciduous forests. Solitary creatures, hoary bats roost alone in foliage and under the thick bark of Douglas firs, ponderosa pines, and cottonwoods. Less often, they nest in caves, in gray squirrel nests, and tucked under driftwood. The bats roost 10 to 40 feet above the ground, the males choosing lower sites and the females higher ones, especially females that have young. The bats begin arriving in Montana each spring during May, and in September fly south for warmer climates, most likely (no one is certain) to the southern United States, Mexico, and parts of South America.

Scientific name

Lasiurus is from the Greek *lasios*, meaning "shaggy" or "hairy," and *ursus*, for "tail." The species name, ***cinereus***, is Latin for "ashen," referring to the bat's fur color.

Diet and Feeding

Montana's hoary bats mainly dine on scarab beetles, moths, and other flying insects, though they may also kill and eat smaller bats, as has been witnessed in other states. Using its "patagium" (wing membrane) or tail membrane as a net, the bat catches an insect in flight and pulls it to its mouth.

The hoary bat feeds later in the evening than most other bats, showing up in the night sky about one hour after sunset. Because its long wings lessen maneuverability, the hoary bat feeds in open spaces such as over water and roads, in forest clearings, and along forest edges.

Reproduction

Like all bats, the female hoary exhibits "delayed fertilization." After mating in early autumn, the female stores the male's sperm through winter hibernation until spring, when she ovulates and the eggs are fertilized. After a gestation period of 90 days, the young are born in early to midsummer. A litter is composed of one to four young, which are covered in a coat of fine, silver-gray hair. Baby hoaries cling to their mother during the day but are left in the nesting roost at night when she leaves to feed. The young bats can fly within 33 days of birth.

Conservation Status

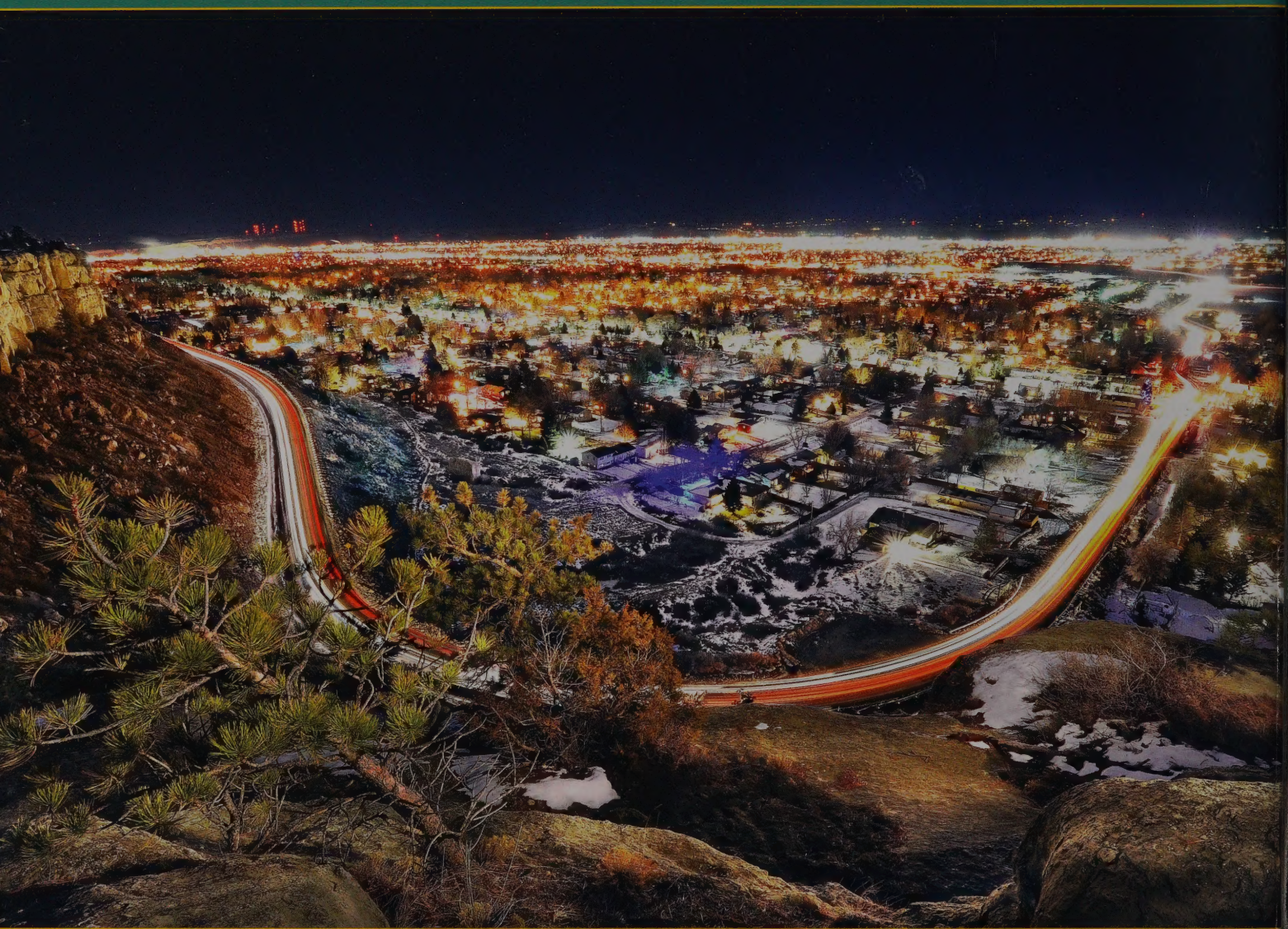
The hoary bat has escaped the insidious white-nose syndrome that has plagued populations of other bat species across the eastern United States. This good fortune, combined with both a widespread range and a large population outside Montana, means the hoary bat has no pressing need for conservation. However, it is listed as a Species of Concern within Montana because the population here, though widespread, is relatively small.

Susie Wall is a writer in Missoula.

MICHAEL DURHAM

Montana State Library
3 0864 1007 0142 7

PARTING SHOT



LIGHT SHOW Time-exposed photography reveals how downtown Billings lights up once the sun goes down. Despite the safety and productivity afforded by nighttime illumination, sometimes people seek a dark sky unmarred by artificial lighting. Learn why on page 16. Photo by John Warner.

Montana Fish, Wildlife & Parks

On-line: **fwp.mt.gov/mtoutdoors**
Subscriptions: **800-678-6668**

MONTANA OUTDOORS $3.50
03>
0 74470 88810 9